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PROCEEDINGS OF THE LINNEAN SOCIETY OF LONDON

149th Session (1936-7)

Part 4

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PROCEEDINGS OF THE LINNEAN SOCIETY OF LONDON

149th Session (1936-7)

Part 4

ANNIVERSARY MEETING

24 May 1937

Dr. W. T. CALMAN, C.B., F.R.S., President,
in the Chair

The Proceedings of the previous meeting, held on Thursday, 6 May 1937, having been circulated, were taken as read and confirmed.

A list of names of those who had made gifts to the Library since the previous meeting was read and laid on the table.

The following Fellows signed the Obligation in the Book of the Charter and Bye-Laws and were admitted :—Tom Clifford Denston, Alan Campbell Gardiner, Robert Haynes Jeffers, the Hon. William Jocelyn Lewis Palmer, Carl Frederick Abel Pantin, John Edward Senaratna, and Andrew William Ernest Soysa.

A certificate of recommendation of the following candidate for Fellowship was read :—For the second time, in favour of Srinivasa Ramanujam.

A certificate of recommendation of the following candidate for Associateship was read :—For the second time, in favour of Francis Rilstone.

The Treasurer presented his Financial Report and the Accounts of the Society, duly audited, for the year 1936-37.

On a motion by Sir ARTHUR W. HILL, K.C.M.G., F.R.S., seconded by Dr. FRED STOKER, the Report and Statement of Accounts were adopted.

Issued 3 November 1937]

The Bye-Laws regulating the Election of Council and Officers having been read by the Assistant Secretary, the PRESIDENT declared the Ballot for Council and Officers to be open, and voting began. The Ballot for Council was closed at 5.30 p.m. and for Officers at 6.0 p.m.

Meanwhile the Librarian and Assistant Secretary presented his Report.

LIST OF THE SOCIETY.—Since the last Anniversary Meeting the Society has lost thirty-seven members. The detailed statement is as follows :—

16 FELLOWS BY DEATH :—Mary du Caurroy Russell Duchess of Bedford, Margaret Jane Benson, Cedric Errol Carr, Alfred Eugène Craven, Robert Darell Smythe Darell, Harold Downes, Arthur Reginald Horwood, Paul Kestner, Clara Ethelinda Larter, Julia Lindley, Charles Geekie Matthew, Marius Maxwell, John Poland, Frederick John Freshwater Shaw, Frederic Wilson Stansfield, George Wingate.

6 FOREIGN MEMBERS BY DEATH :—Hans Jacob Hansen, Louis Alexandre Mangin, Federico Raffaele, Camille Sauvageau, Max Carl Willem Weber, William Morton Wheeler.

2 ASSOCIATES BY DEATH :—William Hales, Daniel Angell Jones.

10 FELLOWS BY WITHDRAWAL :—James Meikle Brown, James Percy Tufnell Burchell, Robert Burgess, Mary Ethelwyn Goodwin, John Humphreys, William Henry Kitching, Jal Phirozshah Mullan, Lilian Jane Veley, Samuel Edward Wilson, Arthur Herbert Ridout Woodforde.

3 FELLOWS BY REMOVAL :—Frederick Sydney Banfield, Laurence Delaney Cleare, junr., Louis William Gordon Malcolm.

During the Session 5 Foreign Members and 29 Fellows have been elected. Of the 29 Fellows elected, 27 have qualified. One Fellow has qualified who was elected during the Session 1935-36.

The present number on the List of Fellows is 735, with 2 Fellows elected, but not yet qualified.

LIBRARY.—Between 1 May 1936 and 30 April 1937 28 books have been purchased and 59 books, 491 parts of periodical publications, and 198 reprints have been presented. During the same period the number of volumes bound was 358. The number of volumes borrowed by Fellows and Associates was 751, and by the National Central Library 173. On the other hand, 10 volumes were borrowed from the Science Library for the use of Fellows. 724 signatures were recorded in the Library Visitors' book, exclusive of 63 for Saturday afternoons.

Mr. A. W. Sheppard has given his usual valuable assistance as an unofficial worker in the Library.

LINNAEAN COLLECTIONS.—Between 29 May 1936 and 23 May 1937 the collections have been consulted 36 times by visitors: the Herbarium 30 times, 55 genera having been examined; the Zoological collections 6 times. Many other visitors have been given a general view of the Collections. Dr. Arvid H. Uggla, Secretary of the Swedish Linnaean Society, again worked for two months on the Linnaean MSS., and in consultation with the Assistant Secretary has rearranged them in a manner that will make them more accessible in future.

At the conclusion of this report the PRESIDENT appointed Mr. E. M. Marsden-Jones, Mr. W. S. Rowntree, and Dr. Malcolm A. Smith as Scrutineers of the Ballot.

In handing the Trail Award and Medal to Dr. CARL FREDERICK ABEL PANTIN, F.R.S., the PRESIDENT addressed him in the following words:—

Dr. PANTIN, The Council have unanimously decided that the Trail Medal and Award for this year shall be given to you. Under the terms of the bequest by the late Prof. J. W. H. Trail the award was established 'to encourage study that throws light on the substance known as protoplasm, or the physical basis of life'. In making the award, the Council had in mind especially your researches on the mechanism of amoeboid movement. This is not the place to enter into an exposition of the results at which you have arrived even if I were competent to do so, but I believe that physiologists generally have accepted your conclusion that the protoplasmic changes involved in amoeboid movement are fundamentally similar to those that go on in ciliated cells and in muscle. This is clearly an advance of primary importance in the field of general physiology and one that falls obviously within

the terms of the Trail award. Further, since the award is declared to be for the purpose of encouraging the study as well as rewarding the student the Council are glad to be assured that you are continuing work in this department of research and look forward with interest to your further publications on the subject.

In reply, Dr. Pantin expressed his great appreciation of the honour conferred upon him.

In handing the Linnean Gold Medal to Dr. FREDERICK FROST BLACKMAN, F.R.S., the PRESIDENT addressed him in the following words :—

Dr. BLACKMAN, In awarding you the Linnean Medal for this year the Council wish to mark their sense of the importance of your long-continued researches in plant physiology, and especially on the problems of nutrition and respiration. It may be said that the modern period in our knowledge of these subjects opened with the publication in 1896 of the first two parts of your 'Experimental Researches in Vegetable Assimilation and Respiration'. In the years which have followed the 'Experimental Researches' carried on by yourself and your students have extended to twenty-one numbers, and in recent years you have added to them the new series of 'Analytical Studies in Plant Respiration'.

The early studies laid a foundation for a new treatment of the influence of external factors on assimilation, and in 1905 you published a paper entitled 'Optima and Limiting Factors' which is a landmark in the analytical study of these effects. It established criteria for all future work, and has influenced the interpretation not only of assimilation, but of all other metabolic processes. You also put forward a scheme of the mechanism of assimilation which has been incorporated in all subsequent hypotheses. Indeed your Continental colleagues have associated your name, in perpetuity, with this branch of science in calling one link in the photosynthetic chain the 'Blackman'sche Reaktion'. In recent years you have performed a similar service to the study of respiration. On other questions of biological and physiological interest you have occasionally, but too rarely, expressed your views, and such subjects you have always illuminated with an individual appreciation.

Your work has been characterized by the invention of accurate and ingenious experimental methods and by a bold yet elegant analysis of experimental results. These qualities you have imparted to your students, and you have influenced, directly or indirectly, a great part of the increasing stream of research

on plant physiology carried out in this country. It has been given to few to have so deep an influence on a whole generation of workers.

In reply, Dr. Blackman expressed his profound appreciation of the honour that had been conferred upon him.

In the introductory passage to his Address the PRESIDENT said :—

In addressing you for the last time from this chair, I must, in the first place, express my deep gratitude to the Fellows of the Society for the kindness and consideration they have shown to me during my tenure of office, and in particular to the Treasurer, the Honorary Secretaries, and the Council for the constant help I have had from them. The President is in a position to realize, as perhaps no one else can, just how much the Society demands from its honorary officers, its Council, and its various Committees. I can assure you, if any assurance is needed, that they have worked hard, that they have worked harmoniously, that they have worked loyally, and that in all our deliberations our only aim has been to advance the interests of the Society.

You have heard from the Treasurer that the Society has received during the year the balance of the Herbert Spencer bequest and also the bequest of the late Lord Wakehurst. It is necessary that the Spencer bequest should be expended within a limited time and the Council have been considering various ways in which the money may be used. We have already applied some of it to the re-decoration of the Library and the Secretaries' room on the first floor which was carried out during the last long vacation. We have devoted some of the money to the re-binding and renovating of old and valuable books in the Library. A dark room for the use of photographers is about to be provided on the top floor, and a committee is considering plans for improving the seating accommodation in this lecture room. In addition to all these the Council has kept in mind the fact that next year we shall celebrate the one hundred and fiftieth anniversary of the foundation of our Society, and we hope to arrange to do so in a fitting manner. You will, I am sure, be interested to know that our former Assistant Secretary, Col. A. T. Gage, has prepared a history of the Society which the Council proposes to publish as a commemorative volume for our sesqui-centenary.

The Council were much disappointed that it proved impossible to carry out the scheme which would have enabled a considerable number of the Fellows to view the Coronation procession from a stand in front of Burlington House. At the last moment

arrangements were hurriedly made for a small number, selected by ballot, to occupy places at the windows.

We have to deplore the loss by death of many respected and valued members of our body. Their names have already been laid before you, and their services to science will be detailed at length in a forthcoming number of our 'Proceedings'. I need not therefore delay here to pay individual tributes to their memory, but I am sure you would not wish me to pass without mention the tragic death of the Duchess of Bedford, who was one of the first lady Fellows to be elected under our new charter in 1904.

The PRESIDENT then delivered his Address, 'James Eights, a pioneer Antarctic naturalist'.

On its conclusion, Professor F. E. WEISS, F.R.S., moved 'That the President be thanked for his excellent Address, and that he be requested to allow it to be printed and circulated amongst the Fellows'. The motion was seconded by Sir SIDNEY F. HARMER, K.B.E., F.R.S., and being put to the meeting was carried with acclamation.

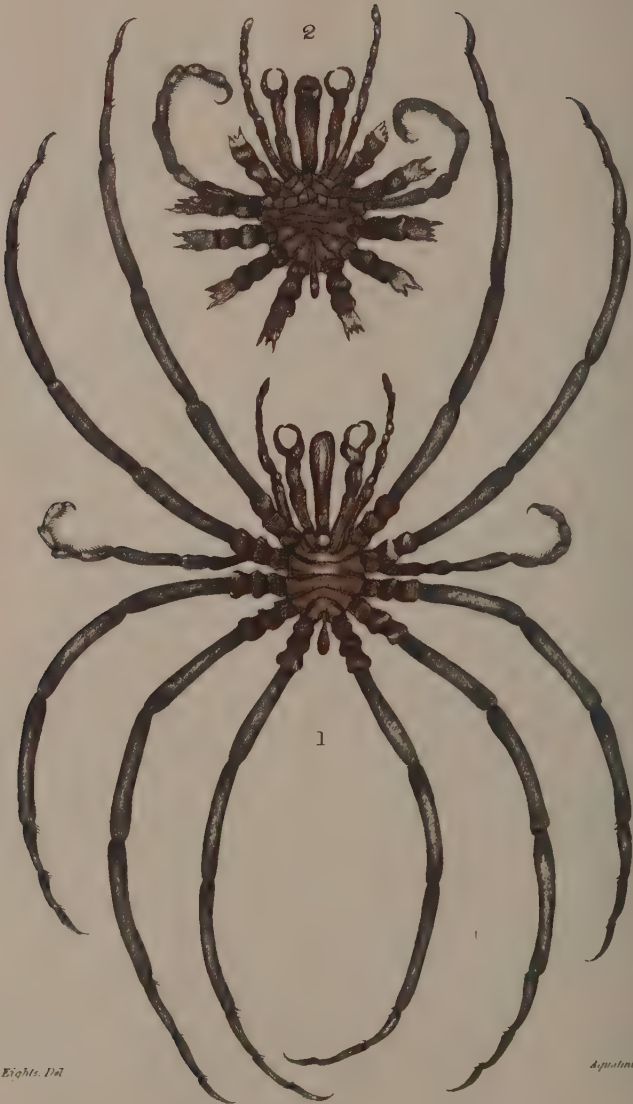
The Scrutineers of the Ballot, who had retired at the appointed times with the voting-lists for the election of the Council and of the Officers, having completed their scrutiny, reported to the President, and he declared the result as follows :—

COUNCIL FOR 1937-38.—Dr. Eric Ashby ; Dr. B. Barnes ; Mr. I. Henry Burkill ; Dr. W. T. Calman, C.B., F.R.S. ; Capt. Cyril Diver ; Mr. Francis Druce ; Miss M. L. Green ; Mr. M. A. C. Hinton, F.R.S. ; Dr. H. S. Holden ; Mr. Fred Howarth ; Dr. Stanley Kemp, F.R.S. ; Mr. Ashley G. Lowndes ; Mr. Charles Oldham ; Mr. John Ramsbottom, O.B.E. ; Mr. D. J. Scourfield, I.S.O. ; Lt.-Col. R. B. Seymour Sewell, C.I.E., F.R.S. ; Dr. Fred Stoker ; Prof. F. E. Weiss, F.R.S. ; Dr. W. H. Wilkins ; Dr. E. B. Worthington.

(The retiring Councillors were Mr. S. Garside, Dr. J. Hutchinson, Dr. Margery Knight, Prof. R. C. McLean, and Prof. Macgregor Skene.)

OFFICERS FOR 1937-38.—*President* : Mr. John Ramsbottom, O.B.E. ; *Treasurer* : Mr. Francis Druce ; *Zoological Secretary* : Mr. Martin A. C. Hinton, F.R.S. ; *Botanical Secretary* : Mr. I. Henry Burkill.

Thereafter the President declared the Session of 1936-37 closed.



James Eights. Dal

Adjusted by G.G. Smith

Decapoda australis.—EIGHTS.

PRESIDENTIAL ADDRESS.

By DR. W. T. CALMAN, C.B., F.R.S., P.L.S.

JAMES EIGHTS, A PIONEER ANTARCTIC NATURALIST.

[PLATE 4 and 3 Text-figures]

ON the 1st of April 1904, Captain Scott's first Antarctic Expedition in the old *Discovery* called at New Zealand on its return from the South. The newspapers were full of messages about the results of the expedition, and in an obscure corner of one of the telegrams was the remark that the naturalist of the expedition, Mr. T. V. Hodgson, had captured a 'ten-legged sea-spider'. Probably few people noticed this statement and, of those who did, one at least put it down to the ordinary journalist's infinite capacity for distorting anything that is said to him on scientific matters. Only one person, so far as I know, came near to guessing what lay behind it. Professor D'Arcy Thompson wrote to me 'I wonder if he has found *Decolopoda*?'

Now *Decolopoda* was the name given, as long ago as 1835, by an American naturalist, James Eights, to a remarkable marine animal which he had discovered on the shores of the South Shetland Islands in the Antarctic. From his account it was clearly a member of the Pycnogonida (sometimes called sea-spiders), but he described and figured it as having five pairs of legs, while all the Pycnogonida known then and for long after had only four pairs. (Plate 4.)

When Scott's expedition reached this country we learned from Hodgson that he had indeed discovered a Pycnogonid with five pairs of legs, but it was entirely different from *Decolopoda*, and he soon afterwards published an account of it under the name of *Pentanymphe antarcticum*. But the story did not end there. A few months later Hodgson received from Dr. W. S. Bruce the Pycnogonida collected on his Antarctic expedition on the *Scotia*. Among these he found another ten-legged form and, his attention having been called to Eights's paper, he recognized that this time he actually had before him a specimen of the long-forgotten *Decolopoda*.

Let us leave the Pycnogonid for the moment to say something of the naturalist whose discovery was thus remarkably confirmed after seventy years of oblivion.

The name of Eights is not mentioned in any of the ordinary works of reference, but the late Dr. J. M. Clarke, of the State Museum at Albany, New York, collected the fragmentary records of his life in a paper* entitled 'The reincarnation of

* I am indebted to Miss Mary B. Cobb, Librarian of the Boston Society of Natural History, for having called my attention to this paper.

James Eights, *Antarctic Explorer*, published in the 'Scientific Monthly' for 1916. As Dr. Clarke's paper does not seem to be widely known and is published in a Magazine not very easily accessible in this country, I make no apology for quoting from it at some length.

James Eights was born in 1798 in Albany, New York State, where his father, Jonathan Eights, of Dutch descent, was a well-known physician. He early gave evidence of artistic skill, and prepared a series of water-colour drawings of his native town which were often copied under the title 'Albany in 1805'. As Dr. Clarke points out it looks as though something had gone wrong with the dates, for in 1805 Eights would have been only seven years old. Of his education there is no record. He became a physician, and in one of his published papers his name is followed by the letters M.D., but what university, if any, conferred the degree is not known. He must have been early interested in Natural History, especially in Geology. On the foundation of the Albany Institute in 1824 his name appears as one of the 'Curators of the collections'.

In the first quarter of the nineteenth century the New England sealers were very busy in the South Seas, but by 1829 the fur seals had been exterminated on all the more accessible beaches and search was being made for new sealing grounds. The United States government were being pressed, by the well-known Captain Edmund Fanning among others, to send out an exploring expedition. The scheme hung fire for many years, but eventually, in 1829, the government gave official sanction (but no money) for 'The first United States Exploring Expedition', of which Captain Fanning was to act as 'agent'. Two brigs, the *Annawan*, N. B. Palmer captain, and the *Seraph*, B. Pendleton captain and commander, were made ready, and as no government funds had been provided, the guarantors hoped that the expenses would be met by sealing. It is to be noted that Fanning did not, as has been stated (H. R. Mill, 1901, p. 519) sail with the expedition.

Eights must by this time have become known as a naturalist, for he sailed as a member of the scientific staff or, as they were called, 'gentlemen companions'. The others were J. N. Reynolds and J. F. Watson. In a letter (referred to below) Eights says that he was 'surgeon and naturalist' to the expedition.

The two ships sailed from New London, Connecticut, in October 1829, and met by appointment at Staten Island, near Cape Horn. At this point the history becomes obscure, not to say mysterious, and Dr. Clarke's account does not give the whole story. In 1830 Pendleton, who had returned home, gave Fanning a report which was transmitted to Congress

and is stated to have been printed by its order. It was at any rate printed by Fanning in his book 'Voyages round the World' published in 1834. In this report Pendleton says that both brigs left Staten Island and proceeded on a 'lengthy cruise for the discovery of land to the westward of Palmer's land and likewise to search for the land said to have been seen by Capts. Macy and Gardiner to the south-westward of Cape Horn'. The attempt was unsuccessful. 'Nor in fact had we the encouragement of passing in the vicinity of any land.' Sickness had broken out among the crews, and the men, whose pay depended on the catching of seals, were on the point of mutiny. Pendleton therefore turned back and went sealing among the islands of southern Chile, where Reynolds and Watson, whose work is highly commended, landed to explore the Araucanian country. In the whole report there is no mention of Eights, and, what is more remarkable, no word of a visit to the South Shetlands, of which Eights was afterwards to publish a description. A different story is suggested by some documents quoted by Balch in a paper on 'Stonington Antarctic Explorers' in the 'Bulletin of the American Geographical Society' in 1909. In these a third brig, of which we have not hitherto heard anything, joins the others at Staten Island. This was the *Penguin*, commanded by A. S. Palmer, who was a brother of the captain of the *Annawan*. The *Annawan* and *Penguin* seem to have parted company with the *Seraph*, and gone off on a sealing cruise among the South Shetlands, while Pendleton pursued his fruitless search for new land further west. The simplest explanation seems to be that, in spite of its high-sounding title, the expedition was simply a commercial sealing venture and was never more than nominally under the command of Pendleton, whose report is only concerned with the doings of his own ship. Eights was no doubt ship's doctor on the *Annawan*, and his experience of the South Shetlands was gained when the *Annawan* went sealing there in company with the *Penguin*.

At all events the ships of the expedition eventually returned, and it would seem that, in addition to Pendleton's report, a further publication on the results of the voyage was contemplated. In a letter* written in 1834 to Amos Binney, the Corresponding Secretary of the Boston Society of Natural History, Eights promises to send him a paper on 'a new and very curious animal' from the South Shetlands, which was,

* This letter is preserved in the Museum of Comparative Zoology at Harvard. My attention was called to it by Miss Frances M. Wilder, the Secretary in charge of files there, to whom I am indebted for a copy of it. By kind permission of Dr. Thomas Barbour, Director of the Museum, the letter is printed below (p. 181).

in fact, *Decolopoda*. He states that this paper was 'one of a number I have on hand which I intend as a scientific appendix to Mr. Reynolds's forthcoming Journal of a voyage to the South Seas etc.' Reynolds's proposed book was never published, and three short papers out of the number that Eights had on hand contain the only account of the scientific results to see the light. I shall deal with these papers in more detail presently.

In the letter from which I have quoted, Eights remarks that Reynolds had decided to present his collections to the Boston Society. This intention was carried out, for in the report of the Society for 1834 we find enumerated a large collection of bird skins, plants, and other specimens from Chile, Peru, and the South Shetland Islands, presented by J. N. Reynolds. The plants obtained by Eights are said to be in the State Herbarium at Albany, but I have not been able to discover if any of the other specimens have survived.

Another and more important voyage of exploration was now being planned, and in 1837 Eights was appointed geologist to the United States Exploring Expedition which was commanded by Charles Wilkes. Eights received a grant for outfit and 'drew pay in advance of sailing until the appropriation was exhausted'. Nevertheless, when the expedition sailed in 1838 Eights's name had disappeared from the list of the scientific staff. Why this happened we do not know. As Dr. Clarke remarks 'Wherever the cause lay, in disaffection acquired by Reynolds for Eights while on their trip to the Antarctic, in the thinly-veiled jealousies common to scientific men of the time, or perhaps in Eights's personal habits, this crushing of his hopes was the downfall of his career'. Dr. Clarke heard too 'of another great disappointment in his life, one that turned his heart sour and kept him a bachelor'. At all event Eights after this seems to have gone completely under. He had done some work for the 'Natural History Survey of New York', and there are one or two further scientific papers, one in 1853 on the superficial deposits of New York State of which Dr. Clarke speaks highly. In 1853, too, Eights's name appears for the last time in the 'Albany Directory' as 'draughtsman and geologist'. Dr. Clarke met an old man who had shared lodgings with Eights in the 'fifties. From his account it was evident that Eights was then in extreme poverty and that, as Clarke says, 'the friendship of the two meant subsistence for one'. So the tragedy of poor Eights's life seems to have drawn itself out for another quarter of a century in loneliness, obscurity, and poverty till his death in 1882 at the house of a sister at Ballston, N.Y., at the age of 84.



FIG. 1.—Copy of one of Eights's figures of '*Brongniartia trilobitoides*', from Trans. Albany Inst. ii, no. 1, pl. 1, fig. 1, 1833. Natural size.



FIG. 2.—Copy of one of Eights's figures of '*Glyptonotus antarctica*', from Trans. Albany Inst. ii, 1852. Natural size.

It is evident that Eights's chief title to remembrance lies in his association with the expedition of 1830, and, on the other hand, the scanty records of that expedition would hardly merit attention nowadays apart from Eights's three short papers.

The first paper to be published was entitled 'Description of a new Crustaceous Animal found on the Shores of the South Shetland Islands, with Remarks on their Natural History' and appeared in the 'Transactions of the Albany Institute' in 1833. The *Brongniartia trilobitoides* here described was, in fact, as Eights later suspected, a species of the well-known Isopod genus *Serolis*, characteristic of Antarctic seas. He was impressed, as many others have been before and since his time, by its resemblance to a trilobite, and to illustrate this resemblance he gives figures of the trilobite *Lichas boltoni*. He makes it clear that he does not regard his *Brongniartia* as identical with the trilobite genus to which that name had previously been given. The usages of nomenclature were still in a very unsettled state, and, having shown that the name *Brongniartia* was not required for the trilobites, he thought himself at liberty to employ it for his newly discovered crustacean. The dangers of such a rough and ready treatment of the principles of nomenclature are illustrated by the fact that his use of the name seems to have misled his friend Amos Eaton, who, in his 'Geological Textbook' (according to Clarke) states that Eights had collected in the Southern Ocean two species of the trilobite genus *Brongniartia*.

Beddard, monographing the genus *Serolis* in his report on the *Challenger* Isopoda, speaks slightly of Eights's description and figures, and doubts if the species be really distinct from *Serolis cornuta* described much later by Studer. As a matter of fact, Eights's account, although showing an inadequate knowledge of previous writings, is by no means bad, and his lithographed figures, drawn by himself, compare very favourably with others published at that time. The specific distinctness of *S. trilobitoides* seems to be finally established by Miss Sheppard in her recent report on the species of *Serolis* obtained by the *Discovery* investigations.

The account of *Brongniartia* is followed by an appendix, a good deal longer than the paper itself and of much more general interest, entitled 'Remarks on the New South Shetland Islands'. Probably owing to the fact that they were appended to a paper on systematic zoology, these remarks do not seem to have received the attention they deserve. They give the earliest attempt at a scientific account of this important group of islands, which had only been named in 1819 by the Englishman Captain William Smith, although they had been known to American sealers at least seven years before that.

Eights's 'Remarks' are written in a style which, if somewhat florid for modern taste, is by no means devoid of literary merit, and I am assured by members of the *Discovery* staff who are familiar with the islands that his descriptions are vivid and apt. I quote a passage almost at random :—

'The sun, even at midsummer, attains but a moderate altitude in these dreary regions, and when its horizontal beams illumine these masses of ice, their numerous angles and indentations catching the light as they move along exhibit all the beautiful gradations of colour from an emerald green to that of the finest blue. . . . When the storms rage and the ocean rolls its mountain waves against their slippery sides, the scene is truly sublime. Tall columns of spray shooting up far above their tops soon become dissipated in clouds of misty white ; gradually descending they envelope the whole mass for a short space of time giving to it much the appearance of being covered with a veil of silvery gauze. When thus agitated they not unfrequently explode with the noise of thunder, scattering their fragments far and wide over the surrounding surface of the deep.'

The only island that Eights mentions by name is Deception Island, the remarkable submerged crater now so well-known to us from later descriptions and photographs, but apparently he also landed on some of the others.

Eights describes in some detail the geological structure of the islands, and his account attracted the attention of so good a judge as J. D. Dana, who reprinted the whole in the 'American Journal of Science' in 1856. He describes, as later writers do, the black columnar basaltic rocks overlying conglomerates and mudstones, now regarded, I believe, as probably of late Mesozoic age. He found what was apparently the first fossil recorded from the Antarctic, 'a fragment of carbonized wood embedded in this conglomerate. It was in a vertical position, about two and a half feet in length and four inches in diameter ; its colour is black, exhibiting a fine ligneous structure, the concentric circles are distinctly visible on its superior end, it occasionally gives sparks with steel and effervesces slightly in nitric acid.' So far as I know, this record has escaped the notice of palaeobotanists.

Of land plants Eights records a species of *Polytrichum*, one or two lichens, one of which was the *Usnea fasciata* described some years earlier by Torrey, and 'a small species of *Avena*', the latter being probably *Deschampsia antarctica* (Hooker).

Several species of seals are mentioned, but Eights was rather at sea about their scientific names. He does, however, mention a species of which he could find no record, but which from his description of the teeth 'with the crown of the grinders

deeply and singularly five-lobed' was doubtless the crab-eating seal, *Lobodon carcinophaga*, described much later by Hombron and Jacquinot (1842).

Among the dolphins Eights mentions a black and white species known to the sailors as the 'sea-skunk'. From the description of its markings as seen swimming in the sea, Dr. F. C. Fraser identifies this as probably *Lagenorhynchus cruciger*, described by D'Orbigny and Gervais in 1847.

One of the most interesting of the birds mentioned is the king penguin, *Aptenodytes patagonicus*, which Eights says 'may be seen in great numbers, covering the shores for some considerable extent'. Curiously enough, the king penguin is now quite unknown on the South Shetlands, but Dr. R. C. Murphy in his 'Oceanic Birds of South America' accepts Eights's record as probably correct and praises his excellent account of its breeding habits. Eights describes how the single egg is carried concealed from sight between the feet and 'when approached they move from you with a waddling gait, rolling it along over the smooth surface of the ground, so that a person not acquainted with the fact might pass through hundreds of them without discovering it'. In spite of Dr. Murphy's guarded acceptance of Eights's statement, some doubt must persist as to the occurrence of the King Penguin so far south of its present range. It was formerly plentiful at Staten Island, where Eights may have watched its habits, and if he were trusting to memory when writing up his notes he might possibly have omitted to make sure that this species was really among the penguins he saw at the South Shetlands.

An antarctic Isopod described by Eights in 1842 seems to have entirely escaped the notice of later writers, no doubt because it was published where no one, surely, would think of looking for such a thing, in an official report on the geology of the State of New York! This was named by Eights *Sphaeroma bumastiformis*, but is doubtless a synonym of *Exosphaeroma gigas* (Leach, 1818). He states that it was 'found in considerable abundance in pools left by the receding tides along the shores of Cape Horn and its adjacent islands'.

In another paper published in 1852, Eights described the giant Isopod *Glyptonotus antarcticus*, which was not found again till Pfeffer redescribed it in 1887 from specimens obtained by the German expedition at South Georgia. This paper was also reprinted by Dana in the 'American Journal of Science' in 1856.

By far the most remarkable of the discoveries made by Eights, however, was that of the *Decolopoda* mentioned at the beginning of this address, and it was the one that had to wait longer than any of the others for confirmation and even

PYCNOGONIDA

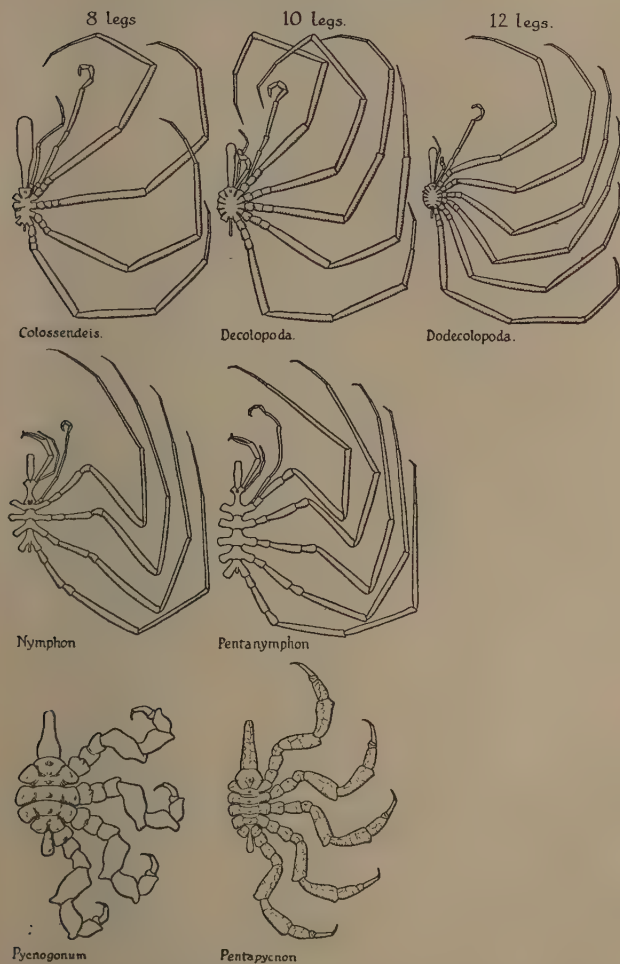


FIG. 3.—Comparison of the decapodous and dodecapodous genera of Pycnogonida with the octopodous genera *Colossendeis*, *Nymphon* and *Pycnogonum*.

for notice. It was described in a paper published in the 'Boston Journal of Natural History' in 1835, accompanied by a plate. J. O. Westwood mentioned the animal in an edition of Cuvier's 'Animal Kingdom' published in London in 1840, but altered the name of the genus to *Decalopoda*, although the derivation given by Eights* clearly requires that it should be *Decolopoda*. For many years, however, the paper remained unnoticed by writers on the Pycnogonida. Dohrn, in his great Naples Monograph, does not mention it. Hoek, in his report on the Pycnogonida of the *Challenger*, quotes the name of the genus from Westwood, but had been unable to see the paper. Stebbing, whose name we in this Society have particular reason to hold in honour, was, I believe, the first to discuss Eights's description (in 1902), but he makes a curious mistake with regard to the number of the limbs, which is inexplicable, unless on the assumption that he was writing from memory. Loman, writing in the very year in which Hodgson re-discovered the species, calls it 'ein irrationelles Monstrum', assuming that Eights had made a mistake in counting the legs. Bouvier, who actually had in his hands a second species of *Decolopoda*, described it in the same year as a species of *Colossendeis*, making no mention of the extra pair of legs and explaining later that he had regarded it as 'une anomalie sans grand valeur'—so unwilling were naturalists to admit the possibility of a ten-legged pycnogon. In 1905, however, Hodgson, as already mentioned, found and re-described the veritable *Decolopoda australis*, and vindicated the accuracy of Eights's observations made nearly three-quarters of a century before. Hodgson says: 'In comparing the South Orkney specimens with Eights' description one is struck with the accuracy of that naturalist'.

We now know five species of ten-legged Pycnogons, all, save one, from the Antarctic, belonging to three widely distinct genera, each of which is paired with a normal genus, from which it hardly differs except in possessing an extra body-somite and a corresponding extra pair of legs (fig. 3). Four years ago Dr. Gordon and I had the good fortune to discover among the Pycnogons brought by Sir Douglas Mawson from the Antarctic a relatively gigantic species having *six* pairs of legs. I have elsewhere discussed the morphological and phylogenetic bearings of these facts, and I need not go into the matter again here. It will be enough to say that I believe that the presence of one or two additional pairs of legs is not, as some writers have argued, a primitive and ancestral feature; that it is rather due to the development of instability in the metameric pattern of normal octopodous forms; and that this development has occurred independently in three separate lines of descent.

* "From δεκα, ten, ὅλος, perfect, ποῖα, feet."

More than half a century has passed away since James Eights went to his grave a broken and a disappointed man. It is fitting that we should pay tribute to the memory of one who, whatever his faults may have been, was an accurate observer, a trustworthy recorder, and a pioneer in the Natural History of the Antarctic.

APPENDIX.

Letter from James Eights to Dr. Amos Binney.

Albany August 9th 1834

Dear Sir

I returned a few days since from the City of New York, where I met my old companion Mr. Reynolds. Mr. R. informs me that he has determined on sending his collections to Boston, agreeable to some arrangement made with your society of Nat. History. I saw part of his Collection in New York, & deem them highly interesting, and the Lyceum there will no doubt feel some mortification in having permitted such a requisition in science to pass beyond their reach—For my own part, I must aver that I am pleased that Mr. R. has selected Boston, and as an evidence of it I have prepared for publication in your journal the description of a new and very curious animal, that evidently occupies the situation between Cuvier's two great classes in the Animal Kingdom, *Crustacea* & *Arachnoides*, possessing essential characters of both. It is one of the number I have on hand, & which I intend as a scientific appendix to Mr. R's forth coming journal of a voyage to the S. seas etc in which I embarked as Surgeon & Naturalist. The description is accompanied by a drawing representing the animal & I only regret that the want of a convenient opportunity alone prevents me from forwarding it immediately

Yours with
Much esteem
I remain etc

to Dr. A. Binney
Boston.

James Eights.
Albany N. Y.

List of papers by James Eights.

An asterisk indicates papers that have not been seen. These are quoted from 'A Bibliography of American Natural History. The Pioneer Century. 1769–1865', by Max Meisel. 3 vols., New York, 1924–1929.

1829. 'Specimens of a singular variety of quartz crystal from Palestine.' Read before Lyceum of Natural History of New York. Brief notice in *Amer. J. Sci.* xvi, no. 2, p. 355.

1833. 'Description of a new Crustaceous Animal found on the Shores of the South Shetland Islands, with Remarks on their Natural History.' *Trans. Albany Inst.* ii, no. 1, pp. 53–69, 2 pls.

The section headed 'Remarks on the New South Shetland Islands' occupies pp. 58–69.

1835. 'Description of a new animal belonging to the Arachnides of Latreille; discovered in the sea along the shores of the New South Shetland Islands.' *Boston J. Nat. Hist.* i, no. 2, pp. 203-6, pl. vii.

The date of publication, often wrongly quoted as 1834, is given on p. 69 of the volume as May 1835.

- *1835-6. (1) 'A Synopsis of the rocks of the State of New York.' (2) 'Notes of a pedestrian' [geological notes on south-eastern New York]. *Zodiac, Albany, N. Y.* i, pp. 27-8, 111-12, 113-16, 141-3, 146-7, 177-8.

1837. First Annual Report of the Geol. Surv. of the 4th dist. of the State of New York. By Lardner Vanuxem. In: *First Ann. Rept. Geol. Surv. New York, 1837*, pp. 187-212.

Signed at end 'Lardner Vanuxem, State Geologist, James Eights, Assistant'.

1842. 'Description [of *Sphaeroma bumastiformis*] furnished by Dr. James Eights,' in: *Nat. Hist. of New York*, vol. iv, Geology, pt. 2, by E. Emmons, pp. 433-4, text-fig. 4 on p. 390.

Meisel adds to his entry of Emmons's report 'Fossils described by James Eights', but I find no evidence of this in the report itself.

- *1846. 'Outlines of the geological structure of Lake Superior mineral region belonging to the N.Y. and L.S. Mining Co.' *Albany, N.Y.* 21 pp. (App. to first Amer. [? Ann.] Rep. of the Company.)

- *1846. 'Notes on Natural History.' *Amer. Quart. J. Agric. & Sci.* iii, no. 2, pp. 219-23.

- *1846. 'On the ice-bergs of the Antarctic Sea.' *Amer. Quart. J. Agric. & Sci.* iv, no. 1, pp. 20-4.

1846. 'On the elevated temperature of the waters of the Gulf Stream.' *Amer. Quart. J. Agric. & Sci.* iv, no. 8, pp. 210-11.

- *1847. 'Notes on Natural History.' *Amer. Quart. J. Agric. & Sci.* v, no. 1, pp. 56-7.

- *1847. 'Notes on Natural History.' *Amer. Quart. J. Agric. & Sci.* v, no. 5, pp. 248-59.

1852. 'Description of a new animal belonging to the Crustacea, discovered in the Antarctic Seas by the author.' *Trans. Albany Inst.* ii [no. ?], pp. 331-4, 2 pls.

(Exact date of publication not ascertained.)

1852. 'Observations on the geological features of the Post-Tertiary formation of the city of Albany and its vicinity.' *Trans. Albany Inst.* ii [no. ?], pp. 335-53, 1 pl.
1852. 'Explanation to Article IV in this Volume.' *Trans. Albany Inst.* ii [no. ?], p. 354.
- Referring to the paper of 1833 quoted above and pointing out the 'close resemblance' of *Brongniartia* to *Serolis*.
- *1854. 'Report in relation to the Fisher Hill and Puckett mines in Guilford Co. N.C.' *Fisher Hill, N.C.*, 7 pp.
- *1855. 'A report on the geological, mineralogical and other resources of the Hiatt tract of land, containing 2000 acres and situated in the county of Surry, N.C.' *Greensborough, N.C.*, 8 pp.
1856. 'Description of an Isopod Crustacean from the Antarctic seas, with observations on the New South Shetlands.' *Amer. J. Sci.* ser. 2, vol. xxii, no. 66, pp. 391-7, 2 pls.
- This consists of a reprint of the paper of 1852 quoted above, followed by an extract of the geological portion of the paper of 1833, with a prefatory note by J. D. D[ana].
- *1858. 'North Carolina : its geology, mining regions, scenery ...' *Mining Mag. & Journ. of Geol.* ... New York and New Haven, x, no. 3, pp. 183-8; no. 4, pp. 268-73; no. 5, pp. 369-73; no. 6, pp. 423-7.

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- STEBBING, T. R. R. 1902. The Nobodies, a sea-faring family, Chap. IV. *Knowledge*, xxv, pp. 185-9.
- WESTWOOD, J. O. 1840. Articulated Animals in: *Cuvier's Animal Kingdom*, ed. E. Blyth and others, London, pp. 401-637. (*Decalopoda* on p. 468.)

EXPLANATION OF PLATE 4.

Facsimile of Eights's plate of *Decolopoda australis* in Boston J. Nat. Hist. i, no. 2, 1835. Fig. 1 shows the upper and fig. 2 the under surface. Both figures are natural size.

OBITUARIES.

MARY DU CAURROY RUSSELL, Her Grace the DUCHESS OF BEDFORD, D.B.E. (1865-1937), whose death is presumed to have occurred on a solo aeroplane flight during the fourth week in March 1937, was one of the first group of women to be elected Fellows of the Society, 15 December 1904. In his presidential address at the Anniversary Meeting on 24 May 1905 Professor W. A. Herdman made the following statement :—

‘ To-day I have had the honour of admitting Her Grace the Duchess of Bedford, who was in the list of first Lady-Fellows elected on December 15th. Such additions can be nothing but a strength and an honour to our Society, and the Treasurer has signalized the historic occasion by a dinner to the new Fellows and by commissioning a picture of the scene at our meeting on January 19th, to be painted by Mr. James Sant, R.A., and presented to the Society for the permanent adornment of our library.’

[It should be added that the picture, not meeting with Sir Frank Crisp’s approval, did not reach the Society’s rooms until after his death.]

Mary du Caurroy, second daughter of the Rev. W. H. Tribe, was born at Stockbridge, Hants, on 26 September 1865, and was educated at Cheltenham Ladies’ College and at Zurich. From 1882 to 1888 she was in India, where her father was Arch-deacon of Lahore. In 1888 she married Lord Herbrand Russell (then A.D.C. to the Viceroy of India), who became eleventh Duke of Bedford in 1893. She was created a D.B.E. in 1928, and held the Royal Red Cross.

The Duchess of Bedford had very wide sympathies, ranging from having a keen interest in sport and natural history, especially ornithology, to being an expert radiographer and an enthusiastic airwoman. As an ornithologist she published papers, and was an Honorary Member of the British Ornithologists’ Union. She founded two private hospitals for the benefit of the villagers of Bedfordshire and Buckinghamshire ; during the War the one near Woburn Abbey received thousands of wounded, to the treatment and nursing of whom she devoted herself.

As it is understood that a Biography of the Duchess is in preparation, only the above brief account of this distinguished lady is given here.

S. SAVAGE.

Dr. MARGARET BENSON was one of the fifteen women elected Fellows of the Linnean Society on 15 December 1904, and was a guest at the dinner to the Lady Fellows on 18 May 1905, given and presided over by Mr. (later Sir) Frank Crisp, then Treasurer and Vice-President of the Society, 'in commemoration of the first admission of women to the full fellowship of the society on 19 January 1905'. After the toast to the King, there was a toast to the Queen 'Hon. member Linn. Soc.'; and then a toast to the 'Lady Fellows of the Linnean Society', which was responded to by Her Grace the Duchess of Bedford, herself one of the newly-elected Fellows.

About this time Dr. Benson began her researches on fossil plants, which study became her life-work and her chief claim to fame as a botanist: but her election to the Linnean Society was a recognition of her valuable contribution to our knowledge of chalazogamy, a phenomenon exciting the interest of botanists at that time. Her first paper on the subject, 'Contributions to the Embryology of the Amentiferae, Part I.', had been communicated to the Linnean Society in June 1893 by Professor F. W. Oliver, who inspired her research, and for whose opinion she had a high regard. The second part was completed with the help of her students, E. M. Berridge and E. F. Sanday, and read before the Fellows of the Linnean Society in November 1905 by Dr. Berridge, Dr. Benson herself, for reasons of health and with a year's furlough, having set off on a tour round the world.

Margaret Jane Benson, who died 20 June 1936, was born in 1859, the sixth child in a family of nine. Her father William Benson was an architect and civil engineer, and one of the seven sons of the Rev. John Benson, Rector of Norton-sub-Hamdon, Somerset. From boyhood he had taken a keen interest in science; and he introduced all his children, boys and girls alike, to field-botany; he always returned from an expedition with his sketch book well filled. The mother, Edmunda, was one of the five daughters of James Bourne, a well-known landscape artist, and she herself painted charmingly. In the year of Queen Victoria's accession, when she was only seventeen years of age, Edmunda Bourne had a large flower-painting exhibited in the Royal Academy. No wonder the daughter Margaret combined with her botanical studies the hobby of painting—this in both water-colours and oils.

In 1871 the family left London for Norton House, Hertford, which was Margaret Benson's home to the end. Her education, which had already begun under her sister Henrietta, who had attended Queen's College, Harley Street, was continued at Norton House until she could carry on her studies alone. For a short time, 1878-9, she resided in Cambridge at Norwich

House, which was associated with the Newnham Hall of those early days. Here she studied classics, the traditional subject of university education. Equipped with a certificate of the Cambridge Higher Local Examination, she obtained the post of assistant mistress in the Exeter High School, where she stayed for eight years, during which, by careful saving out of a scant salary, she gathered the funds to enable her to enter University College, London, in 1887. There she took the degree of B.Sc. in 1891, and began her researches on the Amentiferae, which she continued at Newnham, 1892-3, with the aid of a Fellowship. For this work she was granted the higher degree of D.Sc. (Lond.) in 1894, and elected a Fellow of University College in 1898.

In October 1893 Dr. Benson was appointed Head of the newly founded Department of Botany at Royal Holloway College. She undertook this charge very seriously, and worked indefatigably to build up a school worthy of the University, helped and encouraged by the late Miss Ethel Sargent, who considered Royal Holloway College an ideal place for botanical research. Together they set off in the autumn of 1897 to visit the Professors of Botany of Brussels, Heidelberg, Tübingen, Basel, Strasbourg, and Paris in their respective laboratories during term, in order to secure the best information as to the equipment of a botanical laboratory. Another task she set herself in those early days was to plan and stock a botanical garden, which she did with such foresight that there are flourishing in it today well-grown shrubs and trees of rare botanical interest. Her first botanical gardener was Miss E. J. Welsford. Sir Joseph Hooker, who resided towards the end of his life in Sunningdale, about four miles away, used to visit this garden, and, though critical of the arrangement of the beds by families on Engler's system, presented to the garden an *Aralia mandschurica*, two suckers of which are growing up in place of the original tree, which died down three or four years ago. In 1905 she went round the world, and in 1914 she journeyed to the Antipodes and collected excellent botanical material, which can be seen today in the well-stocked museum and herbarium of Royal Holloway College. Many times she visited Palestine, Egypt, and the continent of Europe, always returning with something of interest for her laboratory: and in addition to the abundant specimens collected on these travels Dr. Benson left the botanical museum enriched with a representative collection of fossils and excellent fossil slides, most of which she had made herself. Her early work in palaeophytology was done at a time when the technique of fossil-cutting was in its infancy; and for years she cut her own sections at a small lapidary bench in a shed in the grounds of Royal Holloway College, with a cutting machine worked by

a gas-engine. The heaped pile of cut coal-balls, as well as the hundreds of fossil slides she left behind, testify to her industry.

The opening of the new botanical laboratories at Royal Holloway College in 1927 was made the occasion for the presentation to Dr. Benson, by former members of her staff, and again to the library in the new building by Dr. Benson, of her portrait done in pencil and wash by Miss Amicia de Biden Footner. A copy of this excellent likeness has been placed with the collection of Fellows' portraits kept at the Linnean Society. At this ceremony were present her old friends and critics, Professor Oliver, Dr. D. H. Scott and Professor Bower, and most of her past assistant lecturers, including Dame Helen Gwynne-Vaughan and Dr. Nesta Ferguson, and a great many of her old students including, among the earliest, Dr. E. M. Berridge.

In 1912, in recognition of the standing of the department of botany, Royal Holloway College, and of her own researches in palaeophytology, the University of London conferred on Dr. Benson the title of University Professor, which she held until her retirement in 1922. She retired to her old home, and for several years lived there with her brothers and sisters, busy with domestic and parish duties. But in 1932, Dr. D. H. Scott persuaded her to publish (Ann. Bot. XLVII, 1933) the evidence she possessed of the structure of the roots of *Heterangium Grievii*. This evidence had been briefly recorded by him in his 'Studies in Fossil Botany' (vol. II, ed. 2, p. 411) as a quotation from a letter from Dr. Benson. The preparation of this paper aroused all the old interest and enthusiasm for fossil botany, and she re-entered the arena with renewed vigour. Her last contribution was to the Botanical Congress in Amsterdam in 1935, where she staged an exhibit illustrating her last two or three papers. Her last published paper was in the 'New Phytologist' (xxxiv, 1935), nearly thirty years after her first publication in that journal, viz., 'The Sporangio-phore; a Unit of Structure in the Pteridophyta' (VII, 1908).

Her name is perpetuated in fossils that have been named after her, but the work of the students she inspired by her teaching, the laboratory and the garden, and the long list of published works are her memorial. Of these last some have already been mentioned. The more outstanding of the others are:—'*Telangium Scottii*, a new species of *Telangium* (Calymmatotheca) showing structure' (1904); 'New observations on *Botryopteris antiqua*' (1911); '*Cordaites Felicis*, sp. nov.' (1912); 'Mazocarpon or the Structural *Sigillariostrobus* (1918), all published in the 'Annals of Botany'; '*Miadesmia membranacea*, Bertrand,—a new Palaeozoic Lycopod with a seed-like structure' (Trans. Roy. Soc. Lond. Ser. B, 198, 1908), '*Sphaerostoma ovale*, a lower carboniferous ovule from

Pettycur, Fifeshire, Scotland' (Trans. Roy. Soc. Edinb., L, 1914); and '*Heterotheca Grievii*,—the microsporangium of *Heterangium Grievii*' (Bot. Gaz. LXXIV, 1922).

After her retirement Dr. Benson kept in close touch with the department she had founded, and was always welcomed back to Royal Holloway College by students and teachers both old and new. Her happy nature and genial presence made her popular: she seemed to remain the same for so many years. Yet her greatest characteristics were perhaps her enthusiastic industry and resolution. She worked indefatigably at her fossils, cutting and interpreting, at her teaching and her collecting. One of her old students has spoken of her 'wonderful dogged determination to carry through what she had made up her mind to do'.

E. M. BLACKWELL.

CEDRIC ERROL CARR was born at Napier, New Zealand, on 16 November 1892, son of the late John Thomas Carr, C.E. At the age of seven he came with his parents to England, and was educated at Dulwich College. In January 1913 he went to Malaya as an assistant on a rubber estate on a three years' agreement; at the expiration of this he returned to England and re-enlisted in the Artists' Rifles, in which he had already served. He was gazetted 2nd Lieutenant in the 60th Rifles in July 1916, was wounded severely at Arras in July 1917, and wounded again in August 1918. On leaving military service in 1919, he obtained another post in Malaya, and was manager of rubber estates in Malacca and at Tembeling, Pahang, until 1931. He then came to Singapore, working much of his spare time in the Herbarium at the Botanic Gardens. In 1932 he made an extended visit to Mount Kinabalu, British North Borneo, collecting specimens for the Singapore Botanic Gardens. Most of 1934 was spent in the Herbarium at Kew, and in October 1934 he left on his final expedition to Papua, where he died at Port Moresby on 3 June 1936.

From his boyhood, Carr was intensely interested in orchids, and he spent much time searching the haunts of the rarer British species. On coming to Malaya, he began to study the local orchids, and acquired a good general knowledge of them; but it was not until he reached Tembeling in 1926 that he began the intensive study which was to become the chief work of the last ten years of his life. Tembeling is an isolated place, approached only by rail and river, and Carr's nearest European neighbour was about 9 miles away. Another man might have succumbed to boredom, but to Carr the wealth of plant-life, and particularly of orchids, in the wide virgin forests of Pahang, came as a revelation which spurred him on

to further work. He got into touch with the Botanic Gardens, Singapore, and through the Gardens Library with the literature of his subject. I well remember a week-end spent at my house, in which he devoted most of his time, till late at night, reading Latin descriptions by J. J. Smith. He spent what time he could spare collecting plants in the forests near Tembeling, bringing them to his garden, and watching them flower. At one time he had as many as 400 local species in cultivation. In this way he learnt to know them very intimately, and studied also their floral biology. His first paper, in 1928, was on his observations of pollination. He soon began to find species not recorded in Ridley's 'Flora', though it contains over 600 orchids. He identified many of his finds with species occurring in neighbouring countries, but some proved to be new, and he set about the task of describing them, taking as his model the careful work of Dr. J. J. Smith. It became a joke among the neighbouring planters that Carr could 'bang out Latin on his typewriter'. He also set himself to learn a technique of drawing the flowers. Every species was first carefully dissected under the microscope and all its parts separately drawn, with the most minutely careful colour notes. Then he prepared very delicate drawings for publication, many of them so fine that the local printers failed to do them justice. He would sit up night after night at this work, with a hot petrol lamp in uncomfortable proximity, visited by a quantity of varied insects, without electric fans or any other amenities of tropical life. In this way he added about 100 species to the known orchid flora of the Peninsula. They are dealt with in a series of papers published in the 'Gardens' Bulletin, Straits Settlements'.

It was my privilege to accompany Carr on a visit to Gunong Tahan, the highest mountain in the Peninsula, in 1928, and to see something of the thoroughness of his field-work. He had an uncanny way of spotting epiphytic species among the mass of growth on the trees by the rivers, and a most remarkable knowledge of the vegetative characters of the many closely related species of the large orchid genera, so that he could distinguish most of them even when not in flower. He seemed if anything to have a special affection for the smaller plants, and at one time made a speciality of the genus *Taeniophyllum*, of which he found a dozen species not previously found in the Peninsula, several of them new.

His collections on a holiday at Brastagi, Sumatra, in 1931, and on his expedition to Kinabalu in 1932 widened his horizon considerably. On Kinabalu he reckoned that he collected about 700 species of orchids, including some 200 of *Bulbophyllum*, a genus in which he was especially interested. Unfortunately he only lived to describe part of these. On

Kinabalu, also, he made a very careful general botanical collection, thereby training himself for the Papuan expedition. He reached Port Moresby, after some delays, early in 1935, and during the next eighteen months, in spite of many difficulties and several attacks of illness, collected some 7,000 numbered series of specimens, climbing the Owen Stanley Range, where he spent several months in the vicinity of Mount Victoria. He was in sight of the conclusion of his expedition, when he succumbed to his final illness (blackwater fever); he was near the Yodda goldfield, whence he was taken about 100 miles by aeroplane to Port Moresby Hospital, too late to save his life.

Though Carr's work was of necessity mainly systematic, he had a wide and intimate knowledge of orchids as living plants and a great interest in biological problems. In a few years he acquired a knowledge of Malaysian orchids such as very few men have possessed, and gave promise of becoming one of the great figures of tropical botany. His death, just as he was looking forward to the study of his accumulated collections, a study which there is at present no one else to undertake, is indeed a great loss to the botanical world.

R. E. HOLTUM.

HAROLD DOWNES (1867-1937) was born at Staverton, Devon, on 31 January 1867, where his father, afterwards the rector of Combe Raleigh, was curate. His early education was at Totnes Grammar School, whence he passed to Edinburgh University and King's College, London, for his medical studies, obtaining the degrees of M.B., L.R.C.P., and L.R.C.S. at one or other of these institutions. After a worthy career in one of the Edinburgh hospitals he was for some time the Medical Superintendent of the Bellefield Sanatorium at Lanark, and eventually (in 1909) settled down in Somerset in private practice and as the Medical Officer of Health for the Ilminster and Chard district.

He took a great interest in any scientific work connected with Somerset, especially in botany and geology, was a member of the Council of the Somerset Archaeological and Natural History Society for many years, acted as President of their Microscopical Section and was a prominent figure in the Botanical Section. His interest in natural history became so great that he decided to devote more time to its pursuit, and in 1921 he retired from active practice to the great regret of many who had a high opinion of his abilities. Since 1921, during his residence first at Martock, and, later, on his return to Ilminster, he spent much of his time in the pursuit of his favourite studies, though he was sometimes pressed into service as a locum tenens by other doctors. Valuable work on the flora of Somerset was done, and by means of lectures he

endeavoured to instil a love of botany into the rising generation. After his return to Ilminster in 1931 failing health caused him to forsake medical work entirely, and he became less energetic in his natural history pursuits.

His strong personality sometimes led him to express his views in too pronounced a manner, but those who knew him well found his companionship enjoyable and stimulating. His name frequently occurs in connexion with notes on the flora of Somerset, but though he was the author of several papers in medical journals, he directly contributed little to botanical literature.

On the last occasion that I saw him we were officially responsible for the judging of the wild flowers competition in the 1936 Taunton Flower Show, but he was too ill to do the work. During the winter he gradually became worse and died on 9 February 1937.

He was a Fellow of this Society from 1917 to 1931, and from 1935 until his death.

W. WATSON.

WILLIAM HALES.—A delightful graciousness characterized the life of William Hales—whom to my great pleasure I had known well for over forty years. He came to Kew in 1894 from the Birmingham Botanic Gardens, at Edgbaston, where he had served under Mr. W. B. Lathom, who was a great plantsman and raiser of the hybrid *Cypripedium* named after him. Studious, and with an intense love of plants, Lathom found a congenial pupil in Hales and encouraged him to study, to attend the meetings of the Birmingham Gardeners' Society, and to set down his thoughts and experiences in writing: but above all he taught him how to grow and propagate plants of all kinds. Hales had been employed previously in a private garden and also in a market garden; he was enthusiastic, and consequently he was an apt pupil. Junior essayist on three occasions, he was twice successful in winning the prize offered by the Birmingham Gardeners' Society. Unusually well prepared for the strenuous duties and studies at Kew (and they were strenuous in those days), Hales soon made his mark, passing through the various courses of study with great success and eventually becoming sub-foreman in the Decorative Department. Very soon it became obvious that he was the man for any first-class horticultural appointment that might fall vacant, and he had visions of a post as Curator of a colonial botanic garden. Fate ruled otherwise. Long neglected, the Chelsea Physic Garden—made famous by Miller—was handed over by the Apothecaries' Company to the care of the City Parochial Foundation. A Curator was needed, a young, able, and enthusiastic man who could redeem the garden from the evil estate into which it had fallen, make

it famous again and useful in the supply of botanical material for the use of students. The advice of Kew was sought and William Hales was recommended and accepted. Few are able to appreciate the difficulties he had to surmount; but before ten years had elapsed he had achieved success and won admiration from all concerned. The Chelsea Physic Garden, as we now know it, is a monument to his untiring energy and enthusiasm. He gave of his very best for a period of about forty years, but some time before he passed away (11 May 1937) it was evident that the tremendous expenditure of energy—physical and mental—was more than his body could withstand. In appreciation of his work, the Trustees sent him on a four months' horticultural tour to Ceylon, Malaya, and Java: this vacation he thoroughly enjoyed, and he returned renewed in health and with a widened knowledge and experience. Teaching, lecturing, examining, judging—all these things he did sincerely and ably, but at the price of failing health; for his physical capacity was not fully equal to the strain imposed upon it. Many honours were paid him. He became President of the Kew Guild, an Associate of the Linnean Society, and one of the Royal Horticultural Society's examiners. The creation of the N.D.Hort. (National Diploma of Horticulture) in 1912 was chiefly the result of his efforts. The Royal Horticultural Society awarded him the coveted Victoria Medal of Honour in Horticulture in 1934, and in 1930 the Veitch Memorial Medal and £25 in recognition of his great services to horticulture and to botany. He was a good and a clever man, who will long be remembered with gratitude by members of the academic staffs of botanical departments of the London Colleges and by many London students. He knew his plants.

C. H. CURTIS.

HANS JACOB HANSEN, who died on 26 June 1936 at Gjentofte, near Copenhagen, in his eighty-first year, was one of the most distinguished of the long line of descriptive zoologists who have placed the Zoological Museum of Copenhagen in the very front rank of the museums of the world.

Hansen was born at Bellinge in the district of Odense on 10 August 1855, and studied at the University of Copenhagen, where he took the degree of Dr. phil. in 1883 with a thesis on the mouth-parts of Diptera ('Fabrica oris Dipterorum'). While still a student he worked at the Museum under J. M. C. Schiødte and in 1885 he was appointed an assistant in the entomological department, a position which he held until 1910, when in consequence of some changes in the staff he felt compelled to resign. At this time, when the continuance of his scientific work seemed to be in danger, a letter was addressed to him by a large number of zoologists in Great

Britain expressing their high appreciation of his researches and their hope that he would be placed in a position to continue them. This letter was published in 'Nature' on 10 March 1910. Together with the efforts of his scientific friends in Denmark, this led to his being allowed to retire on full pay (although this was small enough, even by Danish standards) 'for free scientific activity'. He continued to work unremittingly, and letters received from him in the last year of his life were full of work in hand and plans for the future.

Except for an early contribution to the account of Danish fishes in Schiødte's 'Zoologica Danica', all Hansen's published works deal with Arthropoda. Within the limits of that vast phylum, however, their range is wider than that attempted by any other zoologist of our time. Insects, Myriopoda, Crustacea, and Arachnida formed the subjects of numerous memoirs and monographs that for fullness and accuracy of detail and for exquisite illustration have never been surpassed.

Hansen's attention was especially attracted by those groups that by reason of their annectant affinities are of crucial importance to the morphologist. Thus he monographed the Arachnid Palpigradi and Podogona (until the other day among the rarest of animals) and the Myriopod Pauropoda and Symphyla; but it was on the Crustacea that the greater part of his work was done. When taking part in the first cruise of the 'Ingolf' expedition to the seas of Iceland and Greenland in 1895, he devised a method of sifting the bottom deposits that revealed an astonishing variety of minute crustacea, and he later published memoirs on the Isopoda and Tanaidacea in which large numbers of new genera and species were established, but the material of many groups still remains undescribed. Even now, little attention has been given to this micro-fauna of the sea-bottom, although it may conceivably play an important part in marine ecology.

Perhaps the most important of Hansen's contributions to morphology was a little paper on the limbs and mouth-parts of Crustacea and insects published in the 'Zoologischer Anzeiger' in 1893. This was intended as preliminary to an extensive treatise on the subject which unfortunately never appeared, for when at length he published his 'Studies on Arthropoda' in 1921-30, he confined himself to elaborating the details without developing further the broader views sketched in the early paper.

Apart from zoology, Hansen's interests lay mainly in politics and in military history. On these subjects he wrote much in newspapers and magazines, and he published a number of pamphlets mostly with the object of warning his countrymen against the increasing influence of German culture and German politics. He urged Danish science students to look to England

rather than to Germany as their 'spiritual home', and was a caustic critic of the 'Germanisering af Dansk Videnskab'. Nearly all his scientific papers were published in English. In 1902 he was elected a foreign member of the Linnean Society of London.

To the above notice, which is reprinted by permission from 'Nature' of 1 August 1936, a few notes may be added on Hansen's connexion with the Linnean Society. His certificate for election as a Foreign Member was signed by S. H. Vines (the President), Alfred Merle Norman, Thos. R. R. Stebbing, and ten other Fellows. The election took place on 1 May 1902. It is not unlikely that the first suggestion came from his friend Mr. Stebbing. The two men had been brought together by their common interest in Crustacea, and although they can have met but seldom (Stebbing never travelled abroad and Hansen only visited this country three times, in 1891, 1902, and 1907), they maintained a constant correspondence which only ended with Stebbing's death. It is of interest to record that in this correspondence each used, as a rule, the language of the other, Stebbing writing in Danish and Hansen in English.

After his election as a Foreign Member, Hansen communicated three papers which were published in Vol. XXIX of the Journal (Zoology), 'The deep-sea Isopod *Anuropus branchiatus*, Bedd., with some remarks on *Bathynomus giganteus* A. M. Edw.' (1903); 'The Ingolfiellidae, fam. n., a new type of Amphipoda' (1903); 'Revision of the European Marine forms of the Cirolaninae, a subfamily of Crustacea Isopoda' (1905).

W. T. CALMAN.

ARTHUR REGINALD HORWOOD died at his home at Brentford on 21 February 1937, after a painful illness of several months. He had occupied the position of Temporary Botanist in the Herbarium, Royal Botanic Gardens, Kew, since 1 September 1924.

Horwood was born at Leicester on 29 May 1879, the son of the Rev. F. E. Horwood, M.A., Rector of South Croxton. He was educated at St. John's School, Leatherhead, and by private tutors. It was intended that he should enter the Indian Civil Service, but he failed to pass the medical examination. For a short time he was a private tutor and army coach. In 1902 he accepted an appointment at the Leicester Museum and was employed there (apart from home service in Cheshire regiments during the war) till he resigned the Sub-Curatorship in 1922. His work at the Leicester Museum helped considerably to raise this well-known provincial museum to its present eminence, and was much appreciated by all connected with the institution. During his employment

there he published a number of books and a considerable number of papers on a wide range of botanical subjects, especially on palaeobotany and the British Flora. The best known of these are 'Plant Life in the British Isles' (3 vols., 1914-16), 'Practical Field Botany' (1914), and 'The Outdoor Botanist' (1920).

At Kew, Horwood was mainly employed on the preliminary identification of European, North African, and Oriental collections, and on re-arranging genera of the Compositae and other families. In his private time he did a great deal of very diverse journalistic work and also edited the late Dr. J. B. Hurry's book 'The Woad Plant' (1930). His most important publication was 'The Flora of Leicestershire and Rutland' (1933), with the late (3rd) Earl of Gainsborough. This is a volume of 687 pages and is a monument to Horwood's capacity for prolonged hard work. It contains interesting features, some of which are new to a British county flora.

Horwood made large collections of English plants, some of which are now preserved in the herbaria of the Leicester Museum, the National Museum of Wales, and the Herbarium of the Royal Botanic Gardens, Kew. He was a of very kindly and generous disposition, although rather determined to live his life and to do his work according to his own ideas and methods; and these did not always accord with wider interests. He was extremely industrious and worked very hard in his independent and individualistic way. His correspondence was large, and he will be much missed by a wide circle of friends to whom he gave unstinted help and advice. Many persons owe their first real interest in botany to stimulation received from him. He was twice married and leaves a widow and four sons.

W. B. TURRILL.

DAVID ANGELL JONES (1861-1936) was born in Liverpool on 14 July 1861. He became known as a keen phanerogamic botanist when a schoolmaster at Machynlleth. A little later he removed to Harlech to take charge of the school there, and he began to be recognized in Britain as one of the best guides for the rare vascular plants of N. Wales, a position he maintained till long after he left Wales. It is, however, as a result of his bryophytic work that he became known throughout the world. When the Moss Exchange Club was founded in 1895 its success was largely due to his enthusiasm.

A schoolmaster friend, S. J. Owen of Croesor, imbued Jones with a desire to find and recognize the mosses and hepatics of Merionethshire, and by their efforts the bryophytic riches of their county and of the neighbouring county of Carnarvonshire gained a prominence in the eyes of botanists which they retain even to the present time. After Owen's death Jones found

other companion 'moss troopers' amongst the members of the Moss Exchange Club, and his ability as a showman for the plants and his keenness in the field were so stimulating that the number of bryologists increased until it was found necessary to form a Section II of the Club, with Jones as its secretary. When the two sections were merged to form the British Bryological Society in 1922 he was elected secretary of this, and retained that office till the early part of 1936, when ill-health compelled him to resign. His secretarial work entailed so much writing that he seldom felt disposed to write about his other work, except in the Reports of the Bryological Society; but a few articles from his pen were published in the 'Journal of Botany' and the 'Naturalist'.

His botanical work in N. Wales caused the University of Wales to bestow the degree of M.Sc. on him in 1922; in 1925 he was elected an Associate of the Linnean Society; and at the time of his death he was the President of the British Bryological Society.

For some years he was associated with me in field-work on lichens, and his keenness of eye and thorough methods of observing the substratum enabled him to have an almost uncanny power of detecting rare or uncommon forms of these plants.

After his retirement from scholastic work he resided at Cheltenham and Bristol and it was at the latter place that he died on 6 October 1936 from carcinoma of the gall-bladder.

His death is a great loss to the Bryological Society, as his kindness of disposition, geniality of spirit, and enthusiasm for field-work formed a connecting link between those who took a general interest in the bryophytes and those who studied them in a more scientific manner. W. WATSON.

JEAN FRÉDÉRIC PAUL KESTNER (1864-1936) was born on 7 March 1864 at Mulhouse (Haut-Rhin), France, and died suddenly of a stroke in his home at Chailly-Lausanne on Easter-eve, 11 April 1936.

He started research work when very young, after having studied chemistry at the Chemical School of his native town, Mulhouse. He continued these studies in Paris in 1883 at Wurtz's laboratory of the École de Médecine, after which he was *Chimiste en Chef de Fabrication* at Kuhlmann's big Chemical Works at Loos-lez-Lille during 1884 and 1885. Then followed military service in the 8th Artillery Regiment (Chalons-sur-Marne and Nancy).

After this break in his scientific and industrial career, he was named sub-director at Kuhlmann's works at La Madeleine-lez-Lille, where he remained for a period of two years. Of

his own choice he relinquished this post in 1890 for research work in Lunge's laboratory at the Zurich Polytechnicum.

From the end of 1890 till the war in 1914, he gave himself up to an independent industrial career, working as few men have worked, with all his soul and brain for the improvement of the industrial conditions in chemical works and in many different branches of industry. The textile industry, for instance, amongst others, has greatly benefited by his discoveries. His inventions were so numerous that even at the present moment (twenty-two years after the beginning of the Great War, which interrupted his industrial work) over 200 of his patents are still in use in divers countries.

His creative genius may perhaps be considered as inherited ; for his paternal great-uncle, Charles Kestner, was the founder of the factory of chemical industry of Thann (Alsace) : it was he who discovered 'l'acide racémique' in 1818 : and in 1823 he had in his works the largest lead-chamber in operation in the world. Years later his son, of the same name, went to St. Rollox at Tennant's request, to install the same process as at Thann. On his mother's side, another of Paul Kestner's great-uncles, Josué Heilmann, was the genial inventor of the machine for wool-combing.

From 1914 to November 1918 Paul Kestner's important works, offices, and home in Lille were in the hands of the enemy, as well as his old family residence and property near Mulhouse : the many companies and offices he had in most of the countries at war had ceased work, and almost all the members of his numerous staff were mobilized. But with characteristic indomitable energy, he turned to other work advantageous to his country. He settled with his wife in Paris, where in the thick of the war (Spring 1917) he founded 'La Société de Chimie Industrielle de France' of which he was President for six years, and then was named Président-fondateur of this important and much needed Society. And as such, he took the initiative of grouping in Paris (in 1919) the representatives of all the Associations of Chemistry of the allied and neutral nations. The result is the International Union of Chemistry, pure and applied.

He also founded the Société des Savants et Inventeurs (Scholars and Inventors).

It would take too long to enumerate all his occupations before, during, and after the war, as well as the number of journals of Societies founded by him, his inventions, and his patriotic work. Concerning the latter, he founded two Societies for propaganda against the enemy, and for keeping up the spirits of the people in country-places and near the frontier. This was done by lectures on the war and on the reasons France and the Allies had for believing in their victory.

Another society was that of the Cinema à la Campagne with motor lorries touring the country with good films (some amusing, some educational, and with views of France), with a lecturer attached to the enterprise—certainly not a financial one. Four of these useful and even necessary societies founded by Paul Kestner, were recognized by the French Government between 1919 and 1923 as being of Public Use (*d'Utilité publique*):—1. La Société de Chimie Industrielle de France; 2. La Société des Savants et Inventeurs; 3. Le Cinema à la Campagne; and 4. La Conférence au Village.

He was also founder of the two important magazines 'La Revue Chaleur et Industrie' and 'Chimie et Industrie'.

The immense services he rendered industry all the world over by his discoveries and other work were recognized by Great Britain, America, and Italy.

In 1920 the British Society of Chemical Industry awarded him their biennial Grand Gold Medal, which to that date only seven greatly distinguished Englishmen had received; and Paul Kestner was the first foreigner on whom it had been bestowed. And when the Society of Chemical Industry decided in 1923 to create honorary members, Paul Kestner was chosen to be one of its first four. In 1921 he was made the twelfth honorary member of the American Chemical Society, probably the most important scientific and technical association of the whole world. Up to then only two foreigners had been awarded this honour. Some few years later the Cross of Commander of the Royal Order of Italy for services rendered to industry was given to him.

Modesty and a natural reserve prevented him from ever mentioning these honours, and the many other medals and distinctions he had received. But he especially appreciated the sympathetic homage of those who could realize the efforts he had made to serve industry, science, humanity, and his country, France! 'Servir' was his motto! And he had great pleasure in recalling in his family-circle the simple bronze medal which La Société d'Encouragement Nationale de France awarded him in 1886 for an automatic pulsometer used for the elevation of acids in chemical industry. He had devised this two years before entering Kuhlmann's Chemical Works when he was but twenty years of age. He was proud to add that from the age of twenty he entirely earned his own living and was absolutely independent of financial or other help from his parents in Alsace.

Though from 1918, having ceased to direct personally the divers firms founded by him, the inventor had not abdicated, and was still considered by his former colleagues their most eminent counsellor.

He undertook then research in agricultural chemistry and

vegetable biology, first in the laboratory near Paris founded by him during the war, and later in one he had fitted up in his old family place in Alsace.

When quite young he had inherited from his father (a physician in Mulhouse) a love for the study of insects, birds, and plants, particularly ferns : and to this old love he turned for diversion when, in 1927, his health was no longer able to stand the strain of the repeated calls made on him : he left Paris (where he had lived from 1915-1927) and settled with his wife at Chailly, above Lausanne, near his daughter and her small family. There, his hobby for plants had full play, first in making a garden of which he was entirely the architect, where wall-plants vied with water-plants and ferns found on his various and varied tours in the South of France, the Tessin and other parts of Switzerland, and his beloved Alsace ; and then in accord with his love of discovery in the creation of new ferns on a purely scientific basis. Some of his hybrids have been a source of great interest to fern-lovers.

He kept up a most assiduous correspondence on the subject of ferns ; and especially since his acquaintance in 1927 with Dr. F. W. Stansfield, the Honorary Editor of the ' Fern Gazette ' and Secretary of the British Pteridological Society. He exchanged spores and rare specimens with many other scientific fern-lovers and botanists in many countries in Europe, America, Manchuria, etc.

A friend of his, Dr. F. de Tavel of Berne, wrote a short but very concise account of the deceased and his work in the June number of the ' British Fern Gazette '. Another Swiss friend also wrote of his charm, his immense kindness and amiability in the ' Gazette de Lausanne ', and of the beauty of his garden.

He died in the full season of a marvellous collection of primulas of which he was very proud.

Unfortunately, he has left no one to continue his promising work ; and his wife, after having consulted many of his botanical friends, has deemed it best to give the scientific part of his hothouse collection to the celebrated Conservatoire et Jardins Botaniques at Geneva, where a young friend of his, Dr. Becherer of Basle, will see that it is well looked after. In the autumn some of the ferns from his garden will also wend their way to Ariana.

CLARA ETHELINDA LARTER (1847-1936) was born in or near Leeds on 27 June 1847 and died on 13 May 1936 after two years of failing health borne with great fortitude. The eldest daughter of the late Thomas Larter, a teacher of languages, she first came to Torquay about 1857 and in her younger days and up to 1885 she was much interested in church

work in connexion with the Belgrave Congregational Church, Torquay, of which church she was at the time of her death the oldest member. There are not many records of her botanical activities during this period, and in 1885 she left Torquay and went to live at Barmouth, North Wales: her herbarium contains some plants from this district. At a date previous to 1899 she must have returned to Devonshire, for she was residing at Combemartin, North Devon, in that year. In 1897 she published her 'Notes on the Botany of North Devon', and in 1900 a 'Manual of the Flora of Torquay'. Her botanical association with the late Mr. W. P. Hiern seems to have started in 1904: it continued till his death in November 1925, and was productive of much new information with regard to the Devon flora and many new county records. She became a member of the Devonshire Association in 1906 and was on its Botany Committee, from the inception of the Committee in 1909 acting Secretary, and Editor of its report in 1914, and again from 1920 to 1923. She was Botanical Recorder for the county in 1924 and 1925, and on the 29th of March 1930 she became chairman of the Association's newly formed Botanical Section, holding that office till 1936. For her services to the Association she was made an honorary member in 1934. On 24 June 1930 she became editor in chief of the new 'Flora of Devon', now nearing publication, assisted by a committee of the leading botanists in the county, and she held this office till failing health in 1935 compelled her to relinquish it.

It was in 1909 that she left North Devon to reside again in Torquay (where she remained till her death), and it was in that year that she became a member of the Torquay Natural History Society, serving as a member of committee 1913-17, 1919-23, 1926-8; was a Vice President in 1917, 1918, 1928, and 1929, and was an excellent chairman of its botanical section, 1925-36, and popular with all its members. She was elected an honorary member of the Society in 1932. She was a most painstaking botanist and an indefatigable worker in the field even in her 86th year, when the writer first made her acquaintance. Her herbarium, bequeathed to the Torquay Natural History Society, contains much excellent material and includes a fine collection of Mosses in which she was at one time deeply interested. She had also considerable knowledge of seaweeds and *Callymenia Larterae* E. M. Holmes, was named after her.

In 1912 she was elected a Fellow of the Linnean Society.

Apart from her botanical interests she was a great lover of poetry, and her reading covered a very wide range. She wrote articles and essays on matters of local Devon interest, numbered many well-known authors among her friends,

and could converse most interestingly on a wide range of subjects. She is much missed by her many friends in Devonshire and elsewhere.

G. T. FRASER.

LOUIS MANGIN, elected Foreign Member of the Linnean Society in 1921, was born at Paris on 8 September 1852 of Lorraine parentage; he died at Orby on 27 January 1937.

He first studied botany with Le Monnier at Nancy and then with van Tieghem at Paris, returning to Nancy as professor of natural sciences at the Lycée at the age of twenty-one, and passing to Louis-le-Grand nine years later. The following year he published his thesis for his doctorate on "Les racines adventives chez les Monocotylédones".

Always attracted to the chemical side of botany he collaborated with Gaston Bonnier in researches on respiration, transpiration and carbon-assimilation, with results which are of interest in the historical developments of these subjects. These were followed by investigations on the physiology of Basidiomycetes, pioneer work which has not been much added to in the fifty years which have since elapsed.

Mangin then turned his attention to the structure of cell membranes, and by his methods of microchemical analyses and differential staining laid the foundation of modern botanical histology; his work on the membranes of Mucorineae and Peronosporaceae is still the basis of text-book descriptions.

From the physiology of fungi and the structure of cell membranes it seemed logical to pass to the study of fungal infections, and this Mangin did with such effect that he is rightly regarded as one of the founders of French phytopathology. His best-known investigations are those on the diseases of wheat, chestnut, vine (with Viala) and fruit-trees; he also studied rots of timber.

In 1904 Mangin was appointed professor of the classification and natural families of Cryptogams at the Muséum national d'Histoire naturelle, Paris, in succession to Dehérain, who had held the chair since 1880, but as professor of vegetable physiology. Here his enthusiasm and administrative ability resulted in his being surrounded by a group of active workers, but in conditions which were surprisingly bad. He continued his mycological investigations but became interested also in phytoplankton. He was one of the four who were responsible for drawing up the International Rules of Botanical Nomenclature agreed on at the Vienna Congress in 1905.

One aspect of his work which has not received the recognition it deserves was his attempt to add precision to the description of moulds such as the common green-coloured species of *Aspergillus*.

In 1920 he was elected by his colleagues to succeed Edmond Perrier as Director of the Museum. His administrative duties, particularly heavy on account of the effects of the War, left him little opportunity for research, but he was able to continue his study of phytoplankton. By the time he retired in 1931 he had extended the activities and raised the prestige of the Museum; but perhaps his greatest service was the building of the magnificent new Botanical Gallery at a cost of twenty million francs, of which the Rockefeller Institution gave a quarter.

Louis Mangin showed his character in his work; when one met him he appeared somewhat reserved but alert and practical, though ever ready to extend to younger men courtesy of a kind suggestive of an older generation.

J. RAMSBOTTOM.

CHARLES GEIKIE MATTHEW (1862-1936).—Surgeon Captain C. G. Matthew was born on 30 July 1862, at Newmilne, Perthshire, and was educated at Edinburgh Academy and at the University of Edinburgh. In 1885 he graduated in medicine, and thereafter for about three years he was in the service of the Peninsular and Oriental Shipping Company. In 1889 he entered the Royal Navy: and for a period of twenty years, spent mainly in the Far East, he served as a surgeon, retiring in 1909 with the rank of Fleet Surgeon. Two years before his return home he was honoured by the Japanese Government and decorated with the Order of the Rising Sun.

At the outbreak of the Great War, Matthew rejoined the Navy and became officer in charge of the Naval Medical Station at Dover, an office which he relinquished in 1918 with the rank of Surgeon-Captain. During the remaining years of his life he resided in his native county at Guildtown, where his death occurred at the beginning of last year.

Matthew developed an early attachment to the study of plants, and during his sojourn in the Far East his interests became increasingly centred on the Ferns of China. He seems to have collected extensively in Hong Kong and south China during the period 1903-7, and in 1908 he published privately an account of the ferns of Hong Kong and the adjacent mainland. In this paper he expresses the view that the island of Hong Kong appears to be a meeting point of floral streams from northern India, Malaya, and China, and in it many species find the northern limits of their distribution. The work by which he is best known to Fellows of the Linnean Society, however, is his 'Enumeration of Chinese Ferns', which was published in the Society's Journal in 1911, and forms a useful supplement to the well-known 'Index Florae Sinensis' by Forbes and Hemsley.

In the later years of his life Matthew renewed his early interest in the British Flora and contributed a good deal to the study of Perthshire plants. He had an experimental turn of mind and showed special interest in the changes which may be induced by the transplanting of native species from their natural habitats to the artificial conditions of the garden. He was a good friend of the Perthshire Society of Natural Science and of the Natural History Museum in Perth. In a quiet, unassuming way, and by gifts of money and books he did much to encourage the study of Natural History in his native county. By way of an indoor hobby he practised bookbinding, an art in which he had considerable gifts; and of his fine collection of Japanese woodcuts many are to be seen in the new Museum and Art Gallery in Perth.

He was elected a Fellow of the Linnean Society in 1909.

For assistance in collecting information relating to Matthew's life and work I am indebted to my friend Mr. John Ritchie, Curator of the Museum and Art Gallery, Perth.

J. R. MATTHEWS.

MARIUS MAXWELL.—On November 2nd of last year Marius Maxwell, the well-known big game photographer, was killed in an aeroplane accident at Nice. He was at the time piloting his own machine, having learnt to fly little more than a year ago. He had taken up the study of aviation so seriously then that, after a very brief period of training in this country, he had flown back to his home in Kenya by himself, an undertaking that was typical and characteristic of the man. For some years past he had been farming coffee on an estate near Thika Bridge in Kenya Colony: he had returned to Europe for a holiday on the Riviera, and while he was engaged in one of his customary afternoon flights the tragedy occurred. He appears to have been experimenting with new turning movements when for some reason unknown, probably an air-pocket, the machine lost elevation and crashed at a great speed: the pilot and his companion were instantly killed.

As a young man Maxwell spent a considerable part of his time in Java, India, and other parts of the East, practising his profession of engineering—his chief work the planning and erecting of sugar-factories: and while so engaged he managed to find time for various hunting expeditions, hunting with the rifle more than with the camera. During this period he obtained many specimens, which later on found their way into the collections of the Natural History Museum, notable amongst these donations being the skull of a Javan Rhinoceros (*Rhinoceros sondaicus*) which carries the record horn of 10 $\frac{3}{4}$ inches in length, and a couple of specimens of the Pigmy

Hog (*Porcula salvanius*), a very rare species from Bhutan. He also presented skulls of tigers, thamin and other rare deer from Eastern Asia, and, at a later date, the magnificent African elephant's head which now adorns the walls of the Upper Staircase of the Central Hall.

In the year 1910 Maxwell visited East Africa for the first time where he undertook a short hunting trip between Nakuru and Lake Baringo. It was then that his enthusiasm was fired by the sight of the teeming herds of game on the plains of Kenya Colony, and he determined to return to the country at some future date fully equipped for a photographic safari. It was not until the spring of 1921 that he was able to carry out this project, when he visited the Masai Province in the district of the Amala River and took some of his best photographs. In his *magnum opus* entitled 'Stalking Big Game with a Camera' (the Medici Society, 1924) there are included a number of extremely good photographs secured on this trip. Perhaps the most striking photograph he ever took was obtained at this time; it is of a Masai bull elephant at a distance of 8 yards and is a wonderful study of this species in an attitude of alarm and suspicion.

Other photographs which he secured while in the Amala River district were the amazing series of snapshots taken one evening, in a forest clearing, of three elephants, the animals being right out in the open and the only cover available for the photographer being a small bush. It was behind this bush that Mr. Maxwell retired to adjust the camera on account of the failing light, stepping out again into full view of the elephants to make further exposures. He had left his companion, Mr. J. H. Barnes, and the Ndorobo tracker some distance away in the bush and with them his rifle, as he did not consider it would be of much service in stopping the animals at such close range.

On this expedition a wonderful series of photographs of galloping giraffes was taken, these being among the first photographs of giraffes in movement to be secured from a pursuing car. During the chase of some of these beasts disaster overtook the photographic party, for the car, in dodging round thorn-trees, ant-hills, and other obstacles, ended up in a wart-hog hole, much, one might imagine, to the discomfiture of the rightful tenant.

In the year 1922 another safari was undertaken: this was along the Northern Guaso Nyiro in the Northern Frontier Province, and was preceded by a short trip down south to the Lake Natron district after buffalo and rhinoceros photographs. When on the Northern Guaso Nyiro some really remarkable photographs of elephants were obtained at Abbas Wen and the Lorian Swamp. In each of these localities

Mr. Maxwell secured photographs of a herd of elephants advancing to the attack; the Lorian Swamp photograph is especially impressive and forms the frontispiece to his monumental book. This book also contains excellent photographs of buffalo, rhinoceros, and hippopotamus; and at the end of the volume there is an appendix on the ancestors of the elephant and its relationship with primitive man. This is followed by a second appendix dealing briefly with the Asiatic or Indian elephant. With characteristic generosity Mr. Maxwell presented large enlargements of his most famous photographs to the Natural History Museum, and these now hang on the walls of the Central Hall and the Upper Landing.

In the spring of 1925 Mr. Maxwell, accompanied by Mr. J. H. Barnes, again visited East Africa, this time with the intention of photographing the Eastern Gorilla and studying its habits. The party motored across Uganda to the Birunga volcanoes, where in 1903 Oscar von Beringe had discovered the Eastern Gorilla (*Gorilla gorilla beringei*). The efforts to secure good photographs of the gorilla were greatly hampered by the density of the undergrowth and the continuous rain which made operations extraordinarily difficult. A photograph of an old male gorilla was secured, the animal standing amidst a dense mass of tropical vegetation with only its head and shoulders exposed. The gorilla in this photograph, on account of the lighting, is extremely difficult to distinguish. A better result was obtained when an opportunity arose to photograph a young specimen being carried on its mother's back, the snapshot showing this method of transport fairly clearly. Some very good photographs were taken of gorilla shelters, and one exposure, which has become a classic, is of a gorilla's sleeping platform built in the fork of a tree about 6 feet from the ground.

Mr. Maxwell had graduated at Zurich before he took up the profession of engineering and specialized in machinery for the manufacture of cane-sugar. He married in 1929 Miss Winifred Ramsay, and at his death was only 48 years old. He was elected a Fellow of the Society in 1924. The Society has lost a most enthusiastic naturalist; the Natural History Museum will be the poorer by the death of one of its most generous donors.

GUY DOLLMAN.

JOHN POLAND, F.R.C.S., who was elected a Fellow of the Society in 1880, was born at Blackheath in 1855. He became a distinguished surgeon, paying particular attention to bodily deformities and orthopaedy, and making many important contributions to the literature of these subjects. He died in May 1937.

FEDERICO RAFFAELE was born in Naples on 4 June 1862. He took his doctor's degree in Natural Sciences in the University of Naples in 1884, as a student under A. Costa and S. Trinchese. Then he was assistant at the Zoological Station, under the direction of A. Dohrn (1885-98). In 1898 he was appointed as Professor of Comparative Anatomy and Zoology at the University of Palermo, and in 1915 he was called to the chair of Zoology in the University of Rome. He retired in 1935, being 70 years old, and died on 3 February 1937.

He was a Fellow of the *Società italiana delle Scienze detta dei XL*, *Socio corrispondente* of the Royal Academy of the Lincei, and of the *Accademia di Scienze, Lettere ed Arti di Palermo*, Member of the *Accademia Pontaniana* of Naples, and from 1925 a Foreign Member of the Linnean Society. He held many important charges in the Departments of Education and Agriculture.

He was the author of a series of papers on the floating eggs and larvae of the Teleosteans of the Gulf of Naples, among which the most important is: 'Le uova galleggianti e le larve dei Teleostei nel golfo di Napoli (Mitth. a. d. Zool. Station zu Neapel, VIII, 1888) in which he described a number of eggs and larvae previously unknown. Raffaele was thereby one of the founders of this branch of Ichthyology. His later papers are mostly on embryological subjects, such as the postembryonal displacement of the abdominal cavity in the Teleosteans (1890), the development of the vascular system of the Elasmobranchs (1891), the perilecithic syncytium of the Teleosteans' eggs (1895), the development of the lateral line in the Amphibians (1900), the closure of the neuropore and the formation of the mesoderm (1901), grafting experiments on the anuran embryos and larvae (1901). He was especially interested in embryological problems; was one of the first to apply the methods of experimental embryology in Italy, and had many students working on these subjects; some of them now holding University chairs.

Raffaele was also greatly interested in the problems of general biology, and wrote many books and essays, such as 'L'individuo e la specie' (1905); 'Il concetto di specie in Biologia' (1907); 'Le nuove tendenze nelle teorie dell'evoluzione' (1912); 'La visione microscopica della vita' (1921); 'Somiglianze e parentele fra gli animali' (1930). In his later years he was called to the direction of the biological section of the 'Enciclopedia italiana', to which he contributed many important articles.

He was a man of very brilliant spirit, of unusually wide culture, endowed with a keen interest in scientific, as well as in humanistic, problems. As a teacher he was particularly

efficacious, being, until his latest days, always interested in the most modern biological problems. G. MONTALENTI.

To this outline of the career of a brilliant investigator, Dr. G. P. Bidder has added the following :—

Raffaele has been for fifty years a kindly figure in the background of my life, characterized by the certainty that if we met after five years or after ten years, relations were unchanged : we met as we had parted. In 1886 he was one of the naturalists daily encountered in the Stazione Zoologica at Naples, generally with his contrasting friend and colleague Dott. Latta—9 inches taller, fair-haired, and aquiline. We passed with a smile and a greeting ; both fresh from our universities, we had no language in common, but I always wanted to know him : he had the most attractive gentle smile and large, dark eyes, with long lashes round them : they looked straight into your eyes and inspired you with absolute confidence.

Two years later, language difficulties had largely disappeared, and his more important position on the staff of the Station brought us into more conversational contact. Then he became *ami de la maison* at the Villa Dohrn, where I also enjoyed largely the open hospitality of its unendingly interesting owner and his gracious Russian wife. To the Dohrn children Raffaele occupied much the position of an honorary uncle ; it is impossible to imagine any child not liking him, and something of the attractiveness of childhood lingered with him very long, without any impairment of manliness. After he went to Palermo we only met by chance of our visits to Naples coinciding ; but in 1917 and again in 1921 I sought him out in Rome, where he was then Professor. The Zoological Station—as were most other things and people in the world—was in troubled waters. We met as brother zoologists and old friends of the Station to consider the position, and had very intimate and helpful discussion of its difficulties. His sunny smile was rather still in 1917—he had been a philosopher in politics, and the world was out of joint more painfully for him than for those who were less thoughtful. By 1932 wounds of the war and the peace had more or less skinned over for all of us. I was enjoying a fortnight's work in the Station when one day I was most happily interrupted by Raffaele, who was on an official visit of inspection. He was clearly old physically, but showed the wonted merry spirit, cordial, laughing, reminiscent, making jokes on the things that troubled him most. That brave merriment is my pleasant last memory of him.

Raffaele had a passion for truth, a love of beauty, and an insatiable curiosity as to the laws of life. He could never do anything unkind nor anything disloyal : I saw one of his

friendships strongly tested, and it proved him to be the friend that sticketh closer than a brother. He was one of those Italians—and there are many such—with whom an Englishman can be friends as he would be with an Englishman. He was one of those men for knowing whom any other man is a better man.

G. P. BIDDER.

CAMILLE SAUVAGEAU (1861-1936), Foreign Member of the Society, was born at Angers on 12 May 1861. He studied at Montpellier and, after a brief period as Professor Agrégé at the Lycée at Bordeaux, held for some years (1889-92) a position at the Museum of Natural History in Paris. It was while he was there that he obtained his doctorate. Subsequently he taught in the universities of Lyon and Dijon, and finally, at the beginning of the century, settled at Bordeaux, where he held a professoriate in the Faculty of Science up to the year of his retirement (1931). He married the daughter of a magistrate in 1911, the only issue being a daughter. He was a foreign member of many societies, and in 1923 was made a Chevalier de la Légion d'honneur.

Up to the year 1895 his published work deals largely with the anatomy of aquatic angiosperms, as well as with certain aspects of mycology (especially diseases of the vine), but subsequent to that date it is almost entirely confined to algae and for the most part brown algae. In fact, Sauvageau's name will always be closely linked with the study of that class, and to few other investigators does science owe so great a contribution with respect to the knowledge of a single group. Practically every family of Phaeophyceae received more or less detailed attention at his hands, and the wealth of fact contained in the numerous comprehensive memoirs that appeared during the forty years that embraced his period of active study is testimony to the energy and industry of the man. Sauvageau had little interest in abstract theories, but he could dwell with a degree of enthusiasm on the data he had collected that sometimes rendered his papers a trifle long-winded. It is possibly this fact and the publication of so many of his researches in the little accessible 'Bulletin of the Biological Station of Arcachon' that is responsible for the incomplete knowledge of Sauvageau's work displayed by some recent publications. Although Sauvageau paid diverse visits to Morocco and the Canaries and evidently travelled extensively in France in connexion with his investigations, he does not appear to have visited other European countries, and to the writer and many others in Britain he was known only through his writings and occasional correspondence.

The earliest researches on Phaeophyceae coincide with the period when Sauvageau was still working in other directions

and deal in the main with *Ectocarpus*. Two papers on the reproduction of the Phaeosporae published in 1896 practically summarize this early work, and at the same time constitute the starting-point for the researches of the first period of Sauvageau's investigations. These comprise the memoirs on the Myrionemaceae (1898) and Cutleriales (1899), both published in the 'Annales des Sciences Naturelles' and both fundamental contributions to our knowledge of the respective groups. In 1900 there began to appear the long series of papers on the Sphacelariales, only finally completed in 1914; it is on this work, together with that of Reinke, that our present knowledge of this morphologically interesting group largely rests.

During the second period Sauvageau devoted much attention to Fucales and Laminariales. Here belongs the comprehensive work on *Cystoseira* (1912, 1920), an important contribution from the taxonomic and morphological points of view, and the study of the European species of *Fucus* (1908, 1923), especially the salt-marsh forms. Detailed studies on the structure of the Laminariales (especially *Saccorhiza bulbosa*) were published in 1918 in the memoirs of the Paris Academy. These were probably undertaken in conjunction with the researches on the life-history of the members of that group, the first account of which appeared in 1915 and which are summarized in the 1918 memoir. To Sauvageau we owe the first clear demonstration of alternation and sexuality in the Laminariales.

It is clear that during these years Sauvageau was occupying himself to an increasing extent with cultures of the swarmers of diverse brown algae, and it was he who, in the early part of the century, more than anyone else showed that such cultures were feasible and paved the way to the investigation of the biology of the group by the more modern methods of present-day workers. And so we find him in the third and last period of his life mainly concentrating on the elucidation of the life-cycle of the lower brown algae (*Ectocarpales sensu lato*). The first fruits of this study, published in the 'Comptes Rendus' in 1917, were the discovery of heteromorphic alternation in *Dictyosiphon*, later (1926, 1927) followed by similar data for the Sporochnaceae. During the post-war period he studied the fate of the swarmers from unilocular and plurilocular sporangia of a large number of annuals among *Ectocarpales*, and showed that these *Eclipsiophyceae*, as he called them, persist during the unfavourable period of the year as minute ectocarpoid forms. This filled a great gap in our knowledge and stimulated to a marked degree the renewed investigation of these forms.

Sauvageau was essentially a morphologist and taxonomist and never deviated from this method of approach. Such

limitations as his work possesses, and they are few, are possibly the result of inadequate equipment and facilities. However that may be his achievement is a great one, and his death means a very serious loss to those interested in the study of marine algae.

F. E. FRITSCH.

FREDERICK JOHN FRESHWATER SHAW, who died suddenly on 29 July 1936, at Pusa, India, in his fifty-first year, was educated at St. Olave's Grammar School, London. He entered the Royal College of Science as a National Scholar in 1904 and obtained the Associateship of the College with the Edward Forbes Medal and Prize in 1908. The following year he took the London B.Sc. with First Class Honours in Botany.

He was appointed to the Indian Agricultural Service in 1910 and posted as supernumerary Mycologist to the Agricultural Research Institute, Pusa. Here he remained, except for short periods at Coimbatore as Mycologist to the Government of Madras and at Simla as Agricultural Expert attached to the Imperial Council of Agricultural Research, until his death. At Pusa he was successively second Imperial Mycologist, Imperial Economic Botanist and Joint Director, a post he held from 1929 to 1934 when he became permanent Director of the Research Institute.

As a mycologist Shaw will be best remembered for his studies on the biology and morphology of the difficult fungal genus *Rhizoctonia*, and for experimental researches on the cause and control of various diseases of jute, rice, and other Indian crops. His work during his early years at Pusa gained him the D.Sc. degree from London University in 1916. When he succeeded Mr. (now Sir) Albert Howard as Economic Botanist in 1928, he took over much work on the improvement of Indian wheat, tobacco, and oil-seeds. He carried out extensive studies on the varieties of pigeon-pea (*Cajanus indicus*), and was especially concerned, in collaboration with Dr. W. McRae, in the breeding of strains resistant to the destructive *Fusarium* wilt disease of this important Indian crop.

Shaw was a good all-round botanist and was particularly successful in the training of Indian post-graduate students in research, so as to fit them for appointment in the various departments of agriculture of the provinces.

After the decision was taken to move the Research Institute, severely damaged by the great earthquake in Bihar in 1934, Shaw was almost entirely responsible for the planning of the new buildings and experimental station near Delhi. These were practically completed, and he was engaged on the final details of the transfer when he died.

Dr. Shaw was made a C.I.E. in the last Honours List before his death.

E. J. BUTLER.

FREDERICK WILSON STANSFIELD (1854-1937) was born at Todmorden, Lancs. His early years were spent in his father's fern nursery at Todmorden, which was founded by his grandfather. He founded a similar business at Sale, which, on qualifying for medicine in 1889, he disposed of to his brother, by whom it was carried on until his death. He practised for a time in Derby and then from 1893 in Reading, where the remainder of his life was passed. He gained the M.D. (Manch.) in 1900 for a thesis on cancer houses, and the D.P.H. (Cantab.) in 1893. He was Public Vaccinator for Reading, and at various dates President of the Association of Public Vaccinators of England, President of the Reading Pathological Society (1935-6), and President of the Oxford and Reading Branch of the British Medical Association. He was one of the founders (in 1891) of the British Pteridological Society, for a time its President, since 1917 Editor of its 'Fern Gazette', and became Hon. Secretary in 1926. He was elected a Fellow of the Linnean Society in 1927.

Dr. Stansfield was a botanist of considerable eminence, with an unusually wide knowledge of the habitats of the rarer British plants, and a prolific writer on biological subjects. He contributed a paper to the Linnean Society's Journal (in 1899), on the production of apospory by environment in an apparently barren fern. His contributions to the Pteridological Society's Gazette are without number.

His correspondence with Continental botanists was extensive. Variable as were his interests, endowed with an unusually retentive memory and an unrivalled knowledge of the subject, he was constant in his devotion to the cult with which his early years were associated.

His leisure was spent in hunting throughout the country and on the Continent for variable forms of British ferns, and by experiment endeavouring to elucidate the mystery of cases of abnormality in the genus. He was responsible for the finding and raising of some of the most beautiful of those among our native ferns, which with unsurpassed generosity he distributed to his friends.

He passed away on Sunday, 1 March, from the effects of pneumonia, following an attack of influenza. W. B. CRANFIELD.

ROBIN JOHN TILLYARD died in New South Wales on 13 January 1937, after a motor accident.

This tragedy removed from the field of zoology, and entomology in particular, one of its most brilliant devotees, whose loss will be felt particularly in Australia and New Zealand.

He was born in Norwich on 31 January 1881, the son of Mr. J. J. Tillyard. He went to Dover College, whence he passed high on the list into the Royal Military Academy,

but was, fortunately for biology, rejected for rheumatism. Having won scholarships for classics at Oxford and mathematics at Cambridge he selected the latter, and took his degree from Queens' College as a Senior Optime in the mathematical tripos of 1903.

It is interesting to reflect how small a part mathematics played in his subsequent career: had he been born a little later it is possible that the rapidly developing school of mathematical biology might have claimed his attention, and field entomology and palaeontology would have been the poorer. He read oriental languages and theology in his fourth year at Cambridge, but was forced by rheumatism to leave England and became mathematical master at Sydney Grammar School: this post he resigned in 1913 and worked for a science degree in the University.

His life was endangered by a railway accident shortly before the outbreak of war, but after two years he was able to continue his studies and received in 1914 the first B.Sc. given by the University, which in 1915 appointed him lecturer in zoology, after being a Linnean Macleay Fellow.

The Linnean Society of London awarded him the Crisp prize and medal in 1917. His growing reputation as an entomologist skilled in field-work as well as in the morphological aspects of the science resulted in his appointment in 1920 as the first chief of the Department of Biology in the newly established Cawthron Institute of Scientific Research, Nelson, New Zealand. Here he came to the fore in the work of practical control of insect pests, and in 1925 received the high honour of election to the Royal Society. The directorship of the Institute followed, in 1926, and he was awarded the Trueman Wood medal of the Royal Society of Arts and Sciences of London. Both Sydney and Cambridge Universities conferred upon him the doctorate of science, and his old college, Queens', made him an honorary fellow. Two years later he returned to Australia as Chief Entomologist to the Commonwealth, but was forced by ill-health to resign in 1934 and remained in Canberra. The Royal Society of Tasmania honoured him with the R. M. Johnston Memorial Medal in 1929; the Clarke Memorial Medal was awarded in 1931 by the Royal Society of New South Wales, and in 1935 he received the Mueller memorial medal.

He was a Fellow of the Royal Entomological Society of London, the Royal Society of New Zealand, and the Geological Society of London, a corresponding member of the Zoological Society of London, and an honorary member of the Entomological Societies of Belgium and America.

His eminence in the study of the phylogeny of insects resulted in his aid being sought in work upon both recent and

fossil specimens, necessitating three visits to Europe and five to America.

He married in 1909 Patricia Craske, M.A., daughter of Mr. W. J. Craske of Borstal, Rochester, who survives him with four daughters. Only those who knew his private life can say how much he, and science, owed to his wife's devoted care through his periods of ill-health, and to her sympathetic help in the work, for which she often prepared illustrations.

Like many another genius with active imagination he fell under the spell of the realm of the unseen world in which he became deeply interested. At the funeral oration at Canberra it was said 'He sought passionately for some great purpose running like a golden thread throughout the phenomena of the Universe . . . For him belief in God was the driving force of his life . . . it led him to service in many spheres, scientific, academic, cultural, and religious . . . above all it gave him such an assurance of the eternal survival of personality that the inevitable fact of death had for him no terrors.'

Tillyard's scientific publications numbered about 180, including three books; they commenced in 1905 and ended with a letter to 'Nature' appearing in the issue of 9 January 1937, so quickly followed by his death that he could not have seen it. Very many of his papers were published by the Linnean Society of New South Wales. His works may be grouped under five heads:—

1. *General Entomology*.—The outstanding works are two books: 'The Biology of Dragon-flies' (Cambridge, 1916) and 'Insects of Australia and New Zealand' (Sydney, 1926). The former dealt very completely with the biology of the group that was his first love and on which his first published paper was written; it will long remain a standard. The life-histories of dragon-flies always interested him, and he was the first to work out the details of many: he pointed out that the adaptations to aquatic life in the larvae cannot be equalled among other insects. His 'Insects of Australia and New Zealand' is another work likely to remain a standard text-book of entomology for students in those countries and of great value to entomologists in general. In both these works especial attention is paid to the light thrown on phylogeny by palaeontology. Although so eminent a field naturalist Tillyard was not greatly interested in the workings of selection, and wrote little on such questions as food preferences of insects or their enemies, the defensive value of coloration, or sexual selection. The distribution of species, especially in connexion with the fauna of Australia and New Zealand, greatly interested him, and in 1914 he proposed a method of plotting distribution by 'specific contours' which would reveal areas of present greatest density of any group as 'zoo-centres', showing by

the shape of the contour whether any group had originated in an area or invaded it from outside and subsequently differentiated therein. He found support in the distribution of archaic insects of several orders for Hedley's theory of an Antarctic continent linking Tasmania and South-eastern Australia, New Zealand, and South America.

The archaic types of Odonata, Mecoptera, and Neuroptera still surviving in Australia received much attention from Tillyard, who took care, however, to point out that forms are not necessarily archaic because they are confined to Australia.

2. *Morphological and Phylogenetic*.—Although he left no order of insects entirely unstudied his chief work was among the orders Odonata, Ephemeroptera or Plectoptera, Neuroptera, Mecoptera, and Trichoptera. Life-histories were found to be of much phylogenetic significance. The primitive moths ascribed by Crampton to the Trichoptera (Micropterygoidea) were shown to be true Lepidoptera, but, with a few others, separated from the vast majority by the similarity of venation in all the wings.

The characteristic rectal respiratory mechanism of dragon-fly larvae was minutely studied and the various forms of 'branchial basket' classified in evolutionary sequence. Tillyard was the first to show that the tracheae, when the larva leaves the egg, are filled with fluid which is gradually displaced by carbon dioxide secreted by the lining membrane, and that not until then does rectal respiration commence. He became an authority on the question of wing-venation and claimed that, with the aid of fossils and archaic survivals, he had established a complete phylogeny of the venation of dragon-flies. The Neuroptera (Lace-wings, Ant-lions, &c) provided equally attractive material. The life-history of *Ithone* was revealed as of possible economic value, 'but it took many years to work out without any thought that the results might even prove of economic value. There could scarcely be a better illustration of the value of pure research in Entomology than this'.

But it was the order Mecoptera (Scorpion-flies) which attracted him most in his later years. This, now represented by a comparatively few species in Australia, is noteworthy for the number of forms of archaic type such as *Nannochorista*, which has come down, almost unaltered, from Permian times.

Intensive study of the relationships of Mecoptera led him in 1918 to formulate his highly important classification of the majority of insects with complete metamorphosis as the 'Panorpid complex' or the Mecopteroid orders; all except Coleoptera and Hymenoptera have been derived from ancestral Permian Mecopteroid forms. This implies that the evolution

of the pupal stage took place three times as a response to the marked change of climate in Permian times; for the whole ancestral Mecopteroid complex, for the Coleoptera, and for the Hymenoptera. The larva responded to the increased drought by going underground and shortening the later instars by a single metamorphosis.

3. *Palaeontology*.—Tillyard especially delighted in discovering the secrets of geology, and two extremely important fossil faunas in the Permian of Kansas and the Permian and Triassic of Queensland and New South Wales added very greatly in his hands to knowledge of the ancestry of living insects. The history of the Panorpid Complex was made clear by new orders such as Protomecoptera, Paratrachoptera, Paramecoptera (including the extremely significant *Belmontia*), and the family Permochoristidae, from which the present-day Nannochoristidae scarcely depart: these were the earliest known Holometabolous insects. Thanks to Tillyard the past history of Mecopteroid insects is as completely known as that of any group of animals from Upper Carboniferous to present day. Other groups described were the Proto-hymenoptera, for which his claim that they are ancestral to Hymenoptera is much disputed, and Protocoleoptera, doubtfully direct ancestors to beetles.

The Protodonata, considered by Tillyard, but not by all experts, to belong to the Megasecoptera, were described as a side line not leading directly to modern dragon-flies whose ancestry is traced through such significant forms as *Brodieia*, a Megasecopteran from upper Carboniferous, and *Kennedyia* from the Kansas Permian, the first true Odonate.

It must have been exceedingly satisfactory to Tillyard to be able to adduce, in 1937, final evidence for his statement in 1921 that living Australian Mecoptera (Nannochoristidae) represent ancestral Diptera: he called them '4-winged Diptera'. In 1929 he described certain fossils from the Permian of Warner's Bay, New South Wales, as bringing the orders Paratrachoptera and Paramecoptera within the scope of Mecoptera: among them was a unique specimen, *Permotipula*, which he claimed as the origin of Diptera through such forms as *Tipula*, the 'Daddy-long-legs'. It was undoubtedly dipterous, but being an incomplete specimen it was not possible to say whether it had two or four wings. However, in his last publication ('Nature', 9 January 1937) Tillyard was able to show that his forecast was correct, for he found in a new fossil for which the group Protodiptera was devised a further specialized Paratrachopteron with four wings, but venation closely resembling that of a present-day family of flies, and showing definite reduction of the metathorax, a stage in the process by which a 4-winged fly could be reduced to a Dipteran.

Tillyard's third book, published in Sydney, 1936, in conjunction with the late Sir Edgeworth David, dealt with certain appearances in late Pre-Cambrian rocks of South Australia. His imaginative interpretation of these, however, as representing a new class of Arthropoda, Arthrocephala, is not accepted by many naturalists.

4. *Evolution of Insects*.—Tillyard's genius found plenty of scope in tracing the evolution of modern insects, and in 1930 he published a new theory of the evolution of insects as a whole.

Strenuously combating the theory that insects had evolved from Crustacea he stressed their relation to Myriapoda, suggesting that both classes had arisen from a primitive type 'Protaptera' with four segments. The chief merit of this theory was that it ingeniously overcame the difficulty of the varying position of the gonopore in the two classes. The processes of segmentation were discussed and anamorphosis called into play: specialized forms are epimorphic while Collembola retain the original protomorphic form. This theory, involving segmental gonads in the ancestor, was much criticised, and in 1935 Tillyard replaced it: he suggested that an original protomorph with only four post-cephalic segments added further segments by anamorphosis, and according to whether interpolation took place anterior or posterior to the original gonad-bearing segment so the resulting descendants were opistho- or pro-goneate.

Tillyard early supported the view that the fragments of Arthropod jaws described as *Rhyniella* from Devonian strata came from genuine Collembola: this view, subsequently proved by discovery of more complete and undoubted remains of this order, finally disposes of Handlirsch's theory that Apterygote insects are degenerate descendants of the Pterygota. It is noteworthy that nowhere could Tillyard find any evidence of the origin of wings, which he considered must have taken place at least as far back as Lower Carboniferous times.

5. *Economic Entomology*.—Tillyard was in the forefront of economic work. In 1920 he advised on the problem of maintaining an adequate supply of natural food for the trout which, introduced into mountain streams, had overrun their food supply. His work on the life-history of *Ithone* led him to try the employment of its larvae to destroy in other countries the larvæ of beetles which devour grass-roots. In 1921 he was responsible for the introduction into New Zealand, and later into Australia, of the parasite of the Woolly Aphis of apple-trees, which was attended with great success. Other pests were also attacked by natural enemies with varying success. The closely linked, but

inversely related, work of combating introduced plant pests by the insects which attack them in their native land found in Tillyard an ardent advocate. In 1926 he visited England to study insects feeding upon Blackberry, Furze, Ragwort, and St. John's Wort, all of which had become a menace to New Zealand: in the case of Ragwort sufficient enemies were found to make it appear possible that control by natural means held a fair prospect of success: the work is being carried on at the present time. G. D. HALE CARPENTER.

Mrs. LILIAN JANE VELEY had ceased to be a Fellow of the Society at the time of her death, which occurred on 2 December 1936. She was one of the original lady Fellows of the Society. Younger daughter of the late Rev. J. Nutcombe, she was educated at Oxford, where, in 1894, she obtained a First Class in Natural Science, taking Animal Morphology for her special subject. She married Mr. V. H. Veley, F.R.S., and from time to time collaborated with him in microbiological research. She was the author of many papers published in the 'Quarterly Journal of Microscopical Science', the 'Transactions of the Entomological Society', and 'Journal of the Linnean Society (Zoology)'. She was much interested in Siamese cats, which she bred with success, and was a keen animal photographer as well as an enthusiastic gardener.

MAX CARL WILLEM WEBER, Foreign Member of the Linnean Society since 1898, was born in Bonn on 6 December 1852, his father German, his mother Dutch. He was trained as a zoologist in his paternal country, studying in Bonn and Berlin; but in 1879 he moved to his maternal country, becoming a teacher of anatomy successively in Amsterdam and Utrecht, and, a few years later, professor of Zoology in Amsterdam.

His researches developed along two lines—the one a study of the Mammalia, the other a study of the biogeography of Malaysia. He had married the algologist Mlle. Anna van Bosse in 1883, and in a happy union his wife's interests were capable of satisfaction by the expeditions that he made; together they visited the coasts of Norway several times, Malaysia twice, and South Africa once. His second visit to Malaysia was as leader of the '*Siboga* Expedition', 1899; and his name will always be remembered on account of its rich results as by his great text-book on the Mammalia.

The *Siboga* Expedition was described by him in Petermann's 'Mitteilungen' (46, 1900, pp. 182-191), and in an introductory part (1902) to the long series of reports which were issued and are still being issued on the results of the Expedition. The area of ocean explored extended from Sourabaya in Java to the Kei Islands, and from the southern end of Timor to the

Sulu Islands and Mindanao. One of the results was the laying down of a biogeographic line, which Pilsener has called "the Weber line", along the eastern side of Timor, the Kei Islands and Ceram, and northwards on the western side of the Ternate Moluccas (see Weber's 'Der Indo-austral. Archipel u. d. Geschichte seiner Tierwelt', 1902): it fixes a boundary between Malaysia and Papuasia. The islands of eastern Malaysia between it and Wallace's line, and the ocean-channels between them, have been subject to far more extensive geologic changes than the corresponding parts of Sundaland; and to this the poverty and peculiarities of their fauna are apparently due. Weber's line is likely to prove of greater biogeographic value than Wallace's famous line along the eastern edge of the Sundaland shelf.

Another result of the *Siboga* Expedition—a result which merits mention—was the discovery of a curious alga, *Thamnochloium*, living in intimate association with a sponge: husband and wife—the zoologist and the botanist—united in studying it.

Max Weber's great reports on the Fishes collected by the *Siboga* are numbered among the most solid pillars of ichthyology, and by themselves they would have sufficed as a monument to their author. His book 'Die Säugetiere', first published in 1904, is a zoological classic; the new edition, expanded to two volumes and enriched by the palaeontological contributions of Prof. Abel, appeared in 1927-28, and in its present form is likely to endure for many years as the leading text-book on the Mammalia.

Professor Max Weber died on 7 February 1937.

I. H. BURKILL and M. A. C. HINTON.

WILLIAM MORTON WHEELER (1865-1937) was born at Milwaukee (Wisconsin) on 19 March 1865, and his death came very suddenly on 19 April last. It occurred in Harvard Square, Cambridge, Mass., where he succumbed in the street before medical aid could be obtained. Wheeler has left behind many friends scattered far and wide: these friends will feel a sense of personal loss, for he inspired affection in all who came to know him.

Wheeler obtained his first post as a schoolmaster in 1885, when he was appointed to teach German and philosophy in the high school of his native city. In 1887 he left to become custodian of the Milwaukee Public Museum: this post he relinquished in 1890 when he was made Fellow of Clark University under G. O. Whitman. After graduating Ph.D. at this university in 1892 he took up the post of instructor in embryology at Chicago University, and in 1897 he was appointed Assistant Professor. In 1899 he was made Professor of Zoology at the University of Texas, and four years later

became Curator of Invertebrates in the American Museum of Natural History, New York. From 1908 to 1935 he was Professor of Entomology at the Bussey Institution, Harvard University, and during 1915 to 1929 he was also Dean of the Bussey Institution. He retired from official academic life in 1935.

Wheeler's early researches were in the domain of general zoology. His important papers between the years 1899 and 1903 included studies on the development of the urino-genital system of the Lamprey, on *Myzostoma*, and on insect embryology. In the last-mentioned subject his two extensive memoirs are still important to-day, and are often quoted. His association with Peckham, Whitman, and Patten, he tells us, directed him into the morphological field, but the living creatures attracted him more strongly than exclusively laboratory work. His subsequent researches were in the world of insects, and the ants in special soon claimed his major attention. On these insects alone he must have published about 150 papers, which dealt with many aspects of ant-life. He has left a large output of high class taxonomic work besides many papers of a bionomical character. His standard textbook on ants in the Columbia Biological Series (1910) is one of his best-known works. A vast amount of further information is incorporated in his 'Ants of the Belgian Congo' (1921-2), a conjoint memoir of over 1000 pages written in conjunction with several collaborators. In 1923 his book 'Social Life among the Insects' appeared, and it was followed by 'Social Insects, their Origin and Evolution' (1928). This latter work was an amplification of its predecessor, and in it the subject is developed in much greater detail. Other of Wheeler's books are 'Emergent Evolution and the Development of Societies' (1928); 'Foibles of Insects and Men' (1928); 'Demons of the Dust' (1931); and 'Colony founding among the Ants' (1933). At least one other book was in course of preparation at the time of his death.

Wheeler's tastes were essentially simple and his mind was that of a scholar. Very early in his career he became well acquainted with German, and he soon became familiar with several other European languages. Besides a knowledge of the classics he was an ardent student of many aspects of sociology, philosophy, and psychology. He visited Europe several times, first in 1893, working at Wurzburg, Liège, and the Naples Zoological Station. His last visit was in 1935, when he attended the British Association meetings of that year. He also travelled extensively in the Tropics and other lands, going as far away as Australia. The combination of wide travel, and an extraordinarily thorough grasp of the literature of his subjects, enabled Wheeler to bring to bear

a very keen and penetrative judgment on problems of social behaviour in insects. His contributions on this subject rank among the most important of his scientific works, and they reveal a series of phenomena of unusual interest and complexity.

As a teacher Wheeler's interest and sympathies lay with the post-graduate research worker—he had little to do with the beginner. Many of his former students are now in established positions and are active investigators. There must be very few who do not look back on their period spent at the Bussey Institution with gratitude and esteem for their teacher. Wheeler's method was to get a student started on his particular problem and then leave him to get along with it. With the minimum of individual attention he managed to draw out the best from these men. When in difficulties, however, they were always able to count upon his guidance and encouragement.

His well-stored mind made him a most stimulating conversationalist, and what he had to say was more often than not leavened with dry humour and a fund of anecdotes. Many of his addresses were a combination of his own kind of humour coupled with shrewd deductions or thought. Wheeler seemed incapable of delivering a dull wordy oration, and his picturesque phraseology delighted his audiences.

Wheeler's personality and erudition fitted him to become head of some great university. He never seemed, however, to wish for advancement in the ordinary sense. The quiet life in his home and work in the Bussey Institution appealed to him more than being in the midst of university activities. The environment at Forest Hills, where so much of his later life was spent, was to his taste, and provided the detachment which enabled him to achieve his great output of scientific work. Most of the leading biological and general scientific societies of America claimed him among their distinguished members. He held the degrees of Sc.D. of Harvard and Chicago Universities and of LL.D. of the University of California. In Europe he was a Foreign Member of the Linnean Society of London and an Honorary Fellow of the Royal Entomological Society; he was also an Honorary Member of the Entomological Societies of France and of Belgium. Wheeler married (in 1898) Miss Dora Bay Emerson who survives him, together with a son and a daughter. A. D. IMMS.

GEORGE WINGATE (1852-1936) was elected a Fellow of our Society on 3 February 1887 and continued until his death, a period of nearly fifty years. Born on 21 November 1852, he was the second son of the Rev. William Wingate and a first cousin of General Sir Reginald Wingate. In 1871 he was

commissioned as an ensign in the 19th Foot; and after transferring in 1875 to the Bengal Staff Corps he had a distinguished career, serving in seven frontier campaigns, amongst which were the Naga Hills Expedition, 1879-80, the Chitral Relief Force, 1895, and the Tochi (North-West Frontier) Campaign, 1897-8. He was promoted substantive Colonel in 1901, at which date he was also made a C.I.E. His service on the frontiers of India amounted to thirty-two years.

His botanical interests appear to have arisen as part of his military duties, for he was the founder of the generally-adopted system of grass farms for supplying fodder to Government animals. Some short time before his death he visited the Society's Rooms and arranged to present a fine collection of water-colour drawings of the grasses of Baluchistan.

Like many of the distinguished soldiers of his period, Colonel Wingate was greatly devoted to the people of the country in which he worked, and on his retirement he gave much time and energy to their betterment. Having purchased land for the purpose, he founded a centre for missionary work among the Pathans, which he continued to control from England for thirty years.

He died at Godalming, Surrey, on 21 August 1936.

S. SAVAGE.

BENEFACTIONS

LIST in accordance with *Bye-Laws*, Chap. XVII. Sect. 1, of all
*Donations of the amount or value of Twenty pounds and
 upwards, received during the past Twenty years.*

1917

British Ornithologists' Union, etc.: Contribution towards
 cost of Mr. H. N. Ridley's paper, £20.

The Royal Society: Second contribution towards the printing
 of Mr. C. F. M. Swynnerton's paper on Form and
 Colouring, £75.

Sir Frank Crisp, Bt.: 'Lindenia', Ghent, 1891-1901.
 17 vols. sm. fol.

1919

Dr. B. Daydon Jackson: MS. index to Linnean Society's
 Journal, Botany, vols. xxi-xl (1884-1912) and the
 botanic entries in the 'Proceedings' for the same period.

1920

The Royal Society: Third contribution towards the printing
 of Mr. C. F. M. Swynnerton's paper as above, £50.

The High Commissioner for the Union of South Africa,
 for the printing of Dr. J. D. F. Gilchrist's paper on *Jasus*
Lalandii, Part II, £60.

1921

The Percy Sladen Memorial Fund: Additional Grant in aid
 of publication of 'Transactions', 2nd ser., Zoology,
 vol. xvii, part 4, £72 10s.

The same: Grant in aid of publication of four papers on the
 Houtman Abrolhos Islands, £100.

The Royal Society: Donation in aid of papers by Mr. N. E.
 Brown and Mr. S. L. Moore, £90.

- Dr. W. Rushton Parker: Donation of a large series of portraits of Naturalists and Persons after whom Genera have been named, and work on rearrangement and annotation of the entire collection.
- Prof. C. S. Sargent, F.M.L.S.: Eight volumes issued by the Arnold Arboretum including 'The Bradley Bibliography'.
- Dr. B. Daydon Jackson: MS. Catalogue of each sheet in the Linnaean Herbarium; bound in two volumes folio.

1922

- The late Sir Joseph Hooker: Donation of his Medals and Decorations. (Reversion to Linnean Society on Lady Hooker's decease.)
- Anonymous donation in aid of publication of the late Dr. E. A. Newell Arber's paper, entitled 'Critical Studies of Coal-Measure Plant-impressions', £60.
- The Percy Sladen Memorial Fund: Cost of printing and illustrating 'Transactions', 2nd ser., Zoology, vol. xviii, pt. 1.

1923

- Dr. W. Rushton Parker: (1) Donation of Oxford New English Dictionary; vols. i-x, 1888-1928, and Supplement, 1933, 4to. (2) Encyclopaedia Britannica: ed. XI, Cambridge, 1920-2. 32 vols. 4to.
- E. Heron-Allen, Esq., F.R.S.: Contribution of £25 towards the cost of paper on the Foraminifera of Lord Howe Island.

1924

- The Percy Sladen Memorial Fund: Cost of printing and illustrating 'Transactions', 2nd ser., Zoology, vol. xviii, pt. 2.

1925

- Mr. Reginald Cory: New Presidential Chair, emblazoned with the Arms of the Society.

1926

- Subscription portrait of Dr. B. D. Jackson, R.N.O.
- Mr. A. D. Michael: A large number of Books and Pamphlets from his Library.
- The late Mr. A. O. Walker: £200 free of Legacy Duty.
- An Anonymous Donor: £100 to establish a Fellowship in memory of the late Prof. E. A. Minchin, F.R.S., Sec.L.S.

The Royal Society: Donation in aid of publication of Mr. G. P. Farran's paper on Biscayan Plankton.—Part 14. The Copepoda, £60.

The late Mr. Frank Morey: £100 free of Legacy Duty.

The late Mr. George Lewis: Books and pamphlets on Entomological subjects.

Capt. E. G. Spencer-Churchill: A copy of a collotype reproduction of 'The herbal of Apuleius Barbarus . . . (MS. Bodley 130)'.

The Percy Sladen Memorial Fund: Cost of printing and illustrating 'Transactions', 2nd ser., Zoology, vol. xix, pt. 1.

1927

The late Mrs. Mary Anne Stebbing: £100 less Legacy Duty.

1928

Carnegie United Kingdom Trust: £666 13s. 4d. for purchase of books.

The Royal Society: £160 (£85 in aid of the publication of Dr. G. Enderlein's paper on 'Die Copeognathen der Seychellen', £75 in aid of Mr. C. V. B. Marquand's paper on 'The Botanical Collections made by Capt. F. Kingdon Ward in the Eastern Himalaya and Tibet in 1924-5').

1929

Carnegie United Kingdom Trust: £666 13s. 4d. for purchase of books.

The Percy Sladen Memorial Fund: £100 in aid of the publication of papers on the Fauna of the Paraguayan Chaco.

Carnegie Trust for the Universities of Scotland: £28 in aid of the publication of papers on the Fauna of the Paraguayan Chaco.

1930

Carnegie United Kingdom Trust: £666 13s. 4d. for purchase of books.

An Anonymous Donor: £23 towards the purchase of an Epidiascope.

The Royal Society: £100 in aid of the publication of Mr. H. W. Pugsley's paper, 'A revision of the British *Euphrasiae*' and Dr. T. A. Sprague's paper, 'The Herbal of Leonhart Fuchs'.

- Mrs. B. Daydon Jackson (the late) : valuable reversion under her Will after three life-tenants shall have died.
- Mr. B. B. Woodward (the late) and Mr. A. S. Kennard : a portion of Mr. Woodward's scientific library and reversion of the remainder.

1931

- Miss E. C. Hatchett Jackson : Bust of Charles Hatchett, F.L.S., by Chantrey.
- Major Vivian Seymer : Volumes from the Library of Henry Seymer.
- Exors. of the late Dr. E. J. Bles : Donation in aid of colour collotype plates to illustrate Dr. Karl Peter's paper on *Xenopus laevis*, £100.
- Dr. Francis Pierrepont Barnard : Bequest of Sir James E. Smith's seal, his collection of seal impressions, and some portraits.
- The Percy Sladen Memorial Fund : Cost of printing and illustrating 'Transactions', 2nd ser., Zoology, vol. xix, pt. 2.

1932

- Mr. Francis Druce : Donation towards the cost of new books, £50.
- The Royal Society : Donation in aid of the publication of papers resulting from Dr. Worthington's Expedition to the East African Lakes, £75.
- Subscription portrait of the late Professor Julius von Sachs, F.M.L.S.
- Cambridge Expedition to the East African Lakes, 1930-31 (Dr. E. B. Worthington, leader).—Unexpended balance of expedition funds, for the publication of the scientific results, £175.
- Carnegie Institution of Washington : Donation of a considerable number of its publications.

1933

- The Royal Society : Donation in aid of the publication of Dr. H. Boschma's paper, 'The Rhizocephala in the collection of the British Museum', £60.
- The Percy Sladen Memorial Fund : Cost of printing and illustrating 'Transactions', 2nd ser., Zoology, vol. xix, pt. 3.

1934

- Mr. Francis Druce : Certain legal expenses connected with the Society's interest in the Will of the late Mrs. Jane Jackson, £33 14s.
- Mr. Warren R. Dawson, F.R.S.E. : Compilation of ' Catalogue of the Manuscripts in the Library of the Linnean Society of London.—Part 1. The Smith Papers'; and cost of binding the additional series of correspondence, etc.
- The Royal Society : Donation in aid of the publication of Dr. G. S. Carter's paper, ' The fresh waters of the rain-forest areas of British Guiana ', and Mr. H. N. Dixon's paper, ' A contribution to the Moss flora of Borneo ', £85.
- The Misses Phipps Tiarks : Copy of portrait of N. B. Ward, F.R.S., F.L.S., by an unknown artist; engraving after Knight's portrait; drawing of Ward's conservatory; and his ' Pitt Club ' medal.

1935

- The Royal Society : Donation in aid of the publication of Mr. W. T. Stearn's paper, ' *Epimedium* and *Vancouveria*, a monograph ', and Dr. F. K. Sparrow's paper, ' A contribution to our knowledge of the Aquatic Phycomycetes of Great Britain ', £150.

1936

- The Trustees of the Will of Herbert Spencer, deceased : £1241 in payment of bequest.
- The Royal Society : Donation in aid of the publication of Mr. W. R. Philipson's paper, ' A revision of the British species of the genus *Agrostis* Linn.' and Dr. E. Fischer-Piette's paper, ' Études sur la biogéographie intercotidale des deux rives de la Manche ', £180.
- The late Lord Wakehurst of Ardingly : £100 free of Legacy Duty.

1937

- Prof. F. E. Weiss, F.R.S. : Zeitschrift für induktive Abstammungs- und Vererbungslehre, Bande 67-73, 1934-37.
- The Royal Society : Donation in aid of the publication of Dr. T. A. and Miss Sprague's paper, ' The herbal of Valerius Cordus ', £20.

TREASURER'S ACCOUNTS FOR THE

(Presented at the Anniversary

Receipts and Payments of the Linnean Society

General

RECEIPTS			£	s.	d.	£	s.	d.
To Balance at 1 May 1936			639	4	0			
„ Cash in hand			13	7	9			
						652	11	9
„ Admission Fees						32	0	0
„ Arrears of Annual Contributions			40	0	0			
„ Annual Contributions for year			2414	0	0			
Do. in advance			118	0	0			
						2572	0	0
„ Composition Fees						154	10	0
„ Interest on Investments (including Income Tax recovered)						312	11	10
Do. Deposit						5	6	1
Do. Post Office Savings Bank Account						15	0	0
„ Sales of Publications :—								
Transactions			19	13	9			
Journals			236	18	4			
Proceedings			10	8	5			
Library Catalogue			1	0	0			
Catalogue of Manuscripts			1	10	0			
						269	10	6
„ Advertisements :—Proceedings						5	19	11
„ Donations in aid of Publications						180	0	0
„ Donations for General Purposes						1	0	0
„ Miscellaneous Receipts						43	0	3
„ Lord Wakehurst Bequest						100	0	0
„ Herbert Spencer Bequest						1241	0	0
						£5584	10	4

Library

RECEIPTS			£	s.	d.	£	s.	d.
To Balance 1 May 1936						32	9	7
„ Interest on Investments (including Income Tax recovered)						49	9	5
„ Transferred from General Account						450	0	0
Do. Do. Herbert Spencer Bequest						40	15	8
						£572	14	8

Fellows Postal

			£	s.	d.	£	s.	d.
To Balance at 1 May 1936						61	10	11
„ Deposits during year						3	6	3
						£64	17	2

YEAR ENDED 30 APRIL 1937.

Meeting, 24 May 1937.)

from 1 May 1936 to 30 April 1937.

Account

PAYMENTS	£	s.	d.	£	s.	d.
By Coal, Electric Current, and Gas.....	97	15	7			
„ Furniture.....	1	17	0			
„ Repairs: Sundry	27	6	9			
„ Taxes and Insurance	62	0	7			
„ Miscellaneous Printing and Stationery.....	137	4	9			
„ Petty Expenses (including Tea and Postage)	181	10	6			
„ Publications:—						
Printing	626	19	10			
Illustrations.....	124	0	4			
Distribution.....	102	3	10			
				853	4	0
„ Salaries and Wages, etc.	1262	1	6			
„ Transferred to Library Account	450	0	0			
„ Zoological Record: Donation for 1936 volume	15	0	0			
„ Purchase of £99 0s. 10d. 3½ per cent. Conversion Stock (Staff Pension Fund)	100	0	0			
„ Purchase of £145 7s. 7d. 3½ per cent. War Stock (Investment of Com- position Fees)	154	10	0			
„ Linnean Medal	15	15	0			
„ Herbert Spencer Bequest:—						
Redecoration of Library etc.	259	10	5			
Transferred to Library Account.....	40	15	8			
				300	6	1
„ Balance at 30 April 1937:—						
Current Account at Bank.....	65	2	3			
Deposit „ „	1050	0	0			
„ „ Post Office Savings						
Bank	800	0	0			
Cash in hand	10	16	4			
				1925	18	7
				<u>£5584</u>	<u>10</u>	<u>4</u>

Account

PAYMENTS	£	s.	d.
By Books.....	27	10	0
Do. Herbert Spencer Bequest	40	15	8
„ Periodicals.....	328	18	4
„ Binding	107	13	0
„ Balance at 30 April 1937	67	17	8
	<u>£572</u>	<u>14</u>	<u>8</u>

Account

	£	s.	d.
By Postage during year.....	12	10	8
„ Balance at 30 April 1937.....	52	6	6
	<u>£64</u>	<u>17</u>	<u>2</u>

Separate Account.

	£	s.	d.		£	s.	d.
To Balance at 1 May 1936 :—				By Goodenough Fund :—			
Westwood Fund	£29	6	11	Transferred to Annual Contributions		9	10 0
Trail Award Fund	21	11	8	Hooker Lecture Fund : cost of Publication		49	15 1
Crisp Award Fund	69	4	7	Minchin Fellowship Fund :—		4	0 0
Hooker Lecture Fund	84	18	2	Transferred to Annual Contributions		12	9 0
Goodenough Fund	14	7		Westwood Fund : cost of Illustrations			
Minchin Fellowship Fund	7	7	6	Staff Pension Fund :—			
				Purchase of £36 10s. 8d. 3½ per cent.		38	6 6
Interest on Investments (including				Conversion Stock			
Income Tax recovered) :—				Balance at 30 April 1937 :—			
Westwood Fund	£11	15	0	Westwood Fund		£28	12 11
Trail Award Fund	3	10	0	Trail Award Fund		25	1 8
Crisp Award Fund	7	10	0	Crisp Award Fund		76	14 7
Hooker Lecture Fund	22	14	0	Hooker Lecture Fund		57	17 1
Goodenough Fund	9	4	4	Goodenough Fund		2	8 11
Minchin Fellowship Fund	4	18	8	Minchin Fellowship Fund		8	6 2
Staff Pension Fund	38	6	6				
						199	1 4
„ Goodenough Fund :—Grant refunded.						£313	1 11
						£313	1 11

General Account

£	s.	d.	£	s.	d.
1000	0	0	Metropolitan 3 per cent. Stock 1941	@103	1030 0 0
1200	0	0	India 3 per cent. Stock	@ 77	924 0 0
1000	0	0	Eastern Bengal Railway 4 per cent. Irredeemable Debenture Stock	@ 96½	965 0 0
1000	0	0	Great Western Railway 4 per cent. Debenture Stock	@109	1090 0 0
312	0	0	London Midland & Scottish Railway 4 per cent. Preference Stock	@ 82	255 16 10
3296	0	0	4½ per cent. Conversion Stock 1940-44	@107½	3547 6 3
277	10	3	3½ per cent. War Stock	@101½	281 13 6
			£8093 16 7		

Library Account

£	s.	d.	£	s.	d.
450	0	0	Forth Bridge Railway 4 per cent. Stock (Bentham Bequest)	@102½	461 5 0
200	0	0	4½ per cent. Conversion Stock 1940-44 (Walker and Morey Bequests)	@107½	215 5 0
530	0	0	East Indian Railway 3½ per cent. Debenture Stock (Tagart Bequest)	@ 85½	453 3 0
88	9	8	London County 5 per cent. Stock 1940-60 (Stebbing Bequest)	@107	89 2 1
			£1218 15 1		

Separate Account

			Separate Account					
£	s.	d.	£	s.	d.	£	s.	d.
£1063 10	7	232 5 0	Metropolitan Water Board 3 per cent. "B" Stock (Westwood Fund)		@ 90	209 0 6		
		667 14 2	Ditto		@ 90	600 18 9		
		163 11 5	Ditto		@ 90	147 4 3		
£315 4	5	100 0 0	New South Wales 3½ per cent. Stock, 1930-50 (Trail Award Fund)		@100	100 0 0		
		300 0 0	2½ per cent. Consolidated Stock (Crisp Award Fund)		@ 77	231 0 0		
		129 10 6	India 3½ per cent. Stock 1931 (Westwood Fund)		@ 90	116 11 5		
£315 4	5	61 18 0	Ditto		@ 90	55 14 2		
		123 15 11	Ditto		@ 90	111 8 4		
		100 0 0	London County 5 per cent. Stock 1940-60 (Minchin Fellowship Fund)		@107	107 0 0		
		1202 19 11	3½ per cent. Conversion Stock (Staff Pension Fund)		@102	1227 1 2		
			(£18 19s. 8d. Ditto, to be transferred on 1 May 1937.)					
			£2905 18 7					

FRANCIS DRUCE, *Treasurer.*

We have (in conjunction with the Professional Auditor, who certifies as to all details) audited the Accounts of the Society for the year ended 30 April 1937, and found them correct. We have verified the Investments and Bank Balances.

Dated this 20 May 1937.

W. B. KEEN, *Chartered Accountant,*
23 Queen Victoria Street,
London, E.C. 4.

J. HUTCHINSON,
D. J. SCOURFIELD,
J. R. NORMAN,
J. RAMSBOTTOM,

Auditors.

ADDITIONS AND DONATIONS

TO THE

LIBRARY

1936-37

Note.—Names of donors are given in square brackets. Separate copies of papers which are included in periodicals received by the Library are no longer catalogued.

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The Royal Research Ship *Discovery II*. By R. A. B. ARDLEY and N. A. MACKINTOSH. Pp. 77-106.

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(The genetics of *Anagallis arvensis* Linn. and *Anagallis foemina* Mill.
By E. M. MARSDEN-JONES, F.L.S.)

Pages 105-106. For *carnea* read *pallida* Hook. fil. For Deep Dull
Bluish Violet read Deep Cadet Blue. Plants
with salmon-coloured corollas referred to = *carnea*
Schrank.

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OF
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FROM OCTOBER 1936 TO MAY 1937

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